November, 1945 Vol. 34, No. 9

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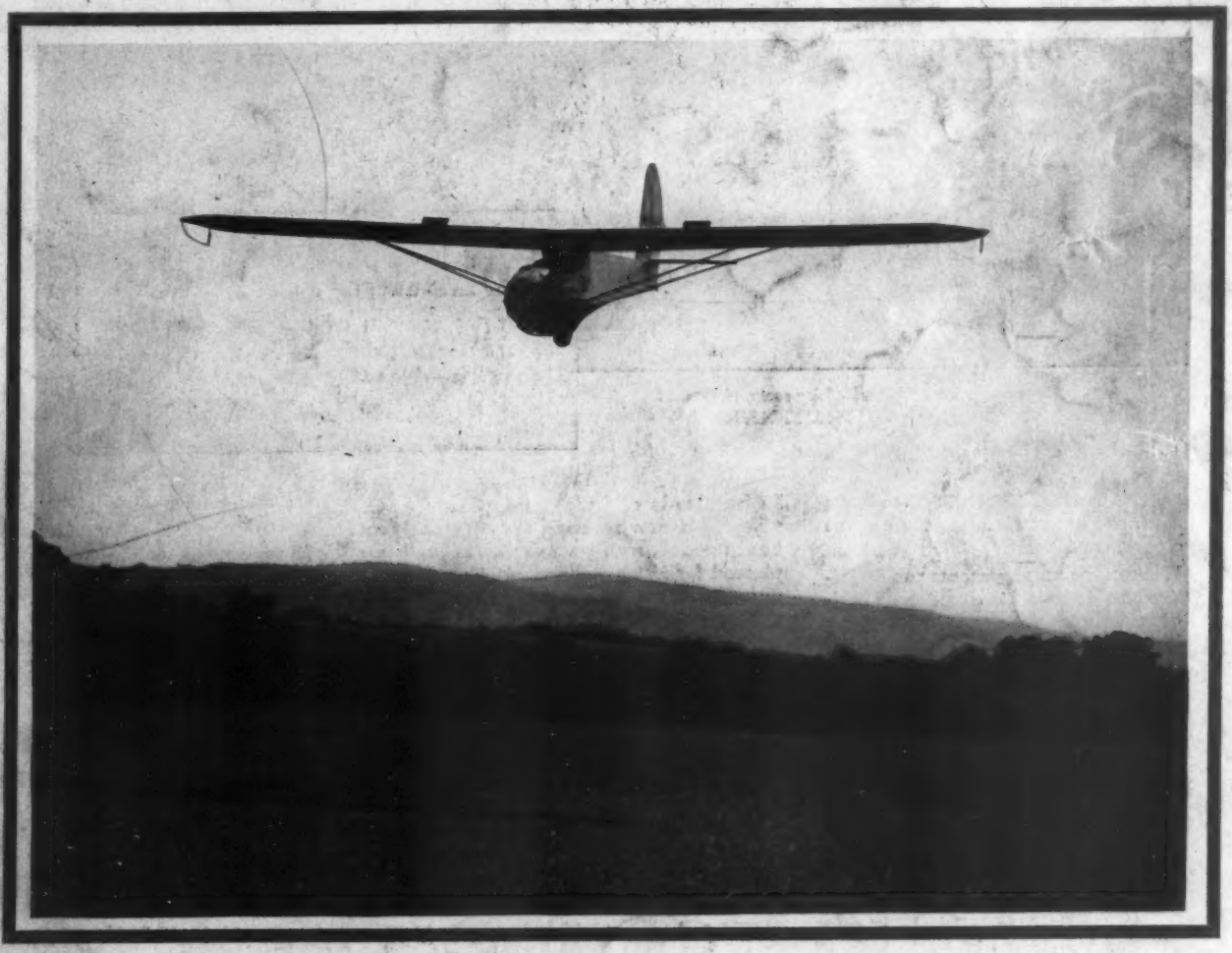
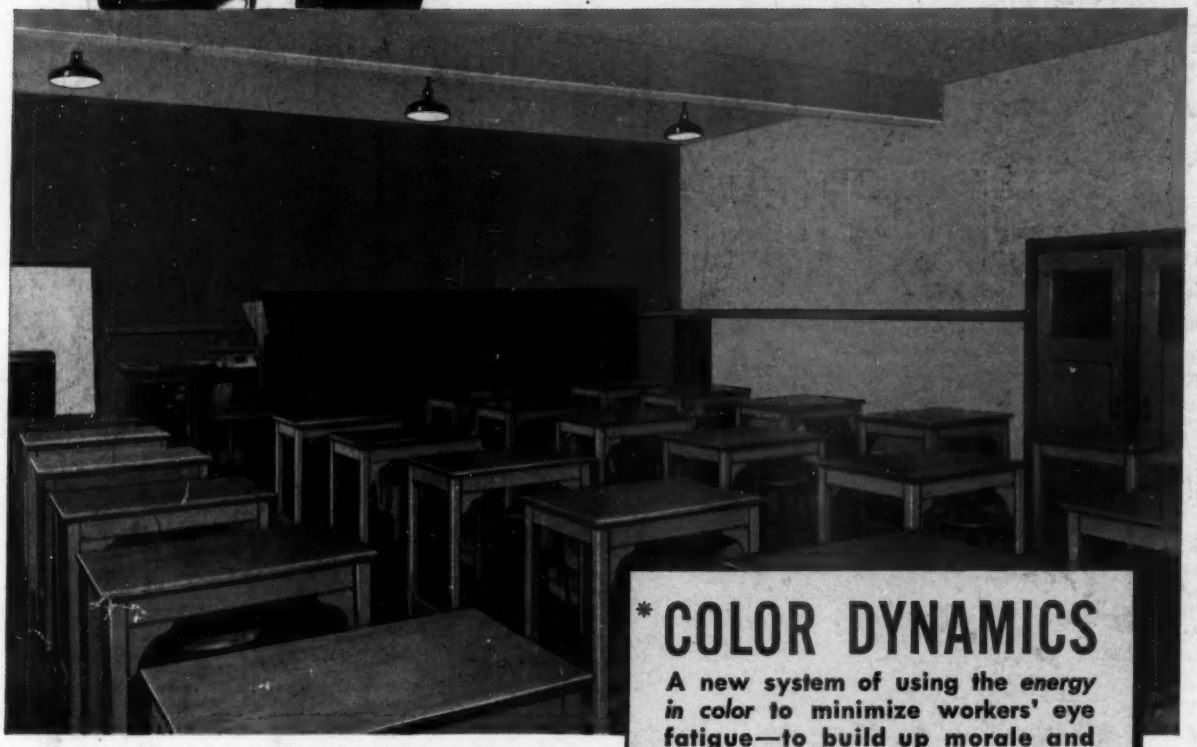


The Shop Teachers' Professional Magazine

Future Shopmen Now Learn About COLOR DYNAMICS*



● *Suggested color plan for vocational drafting room, decorated according to the principles of COLOR DYNAMICS*

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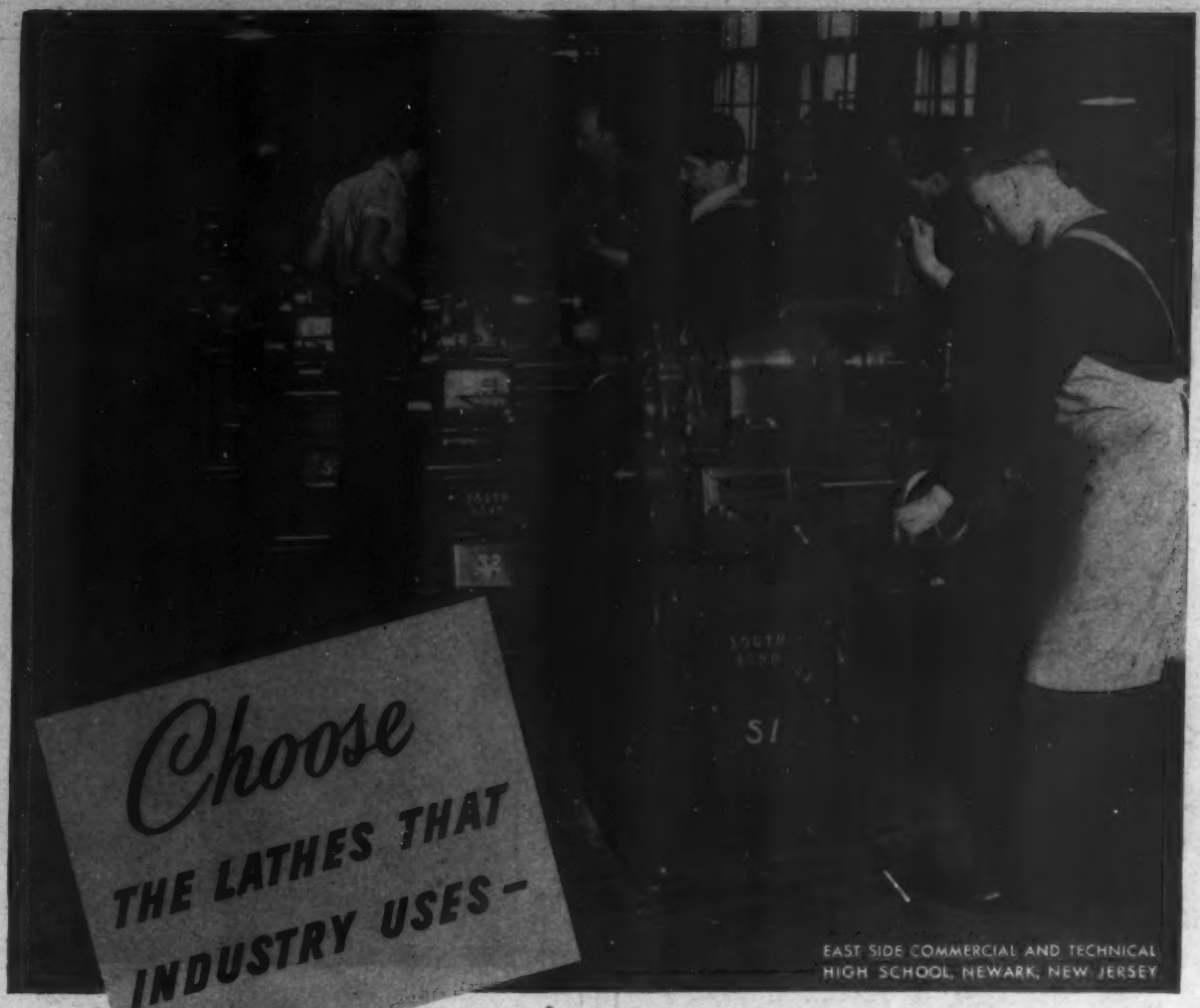

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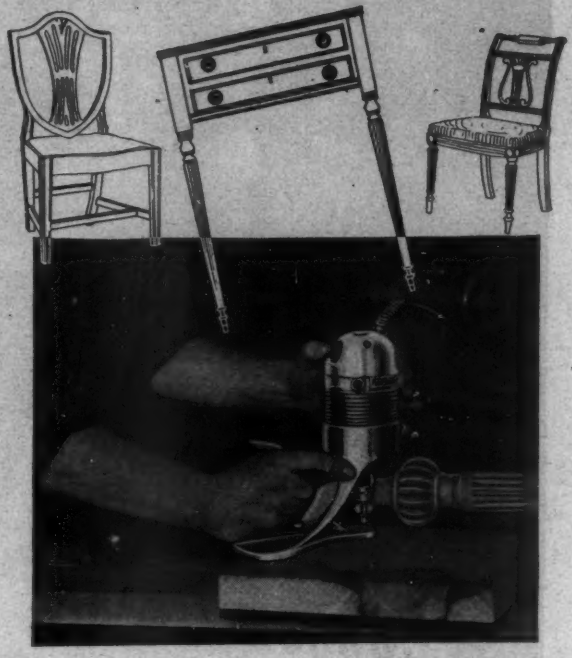

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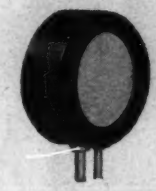

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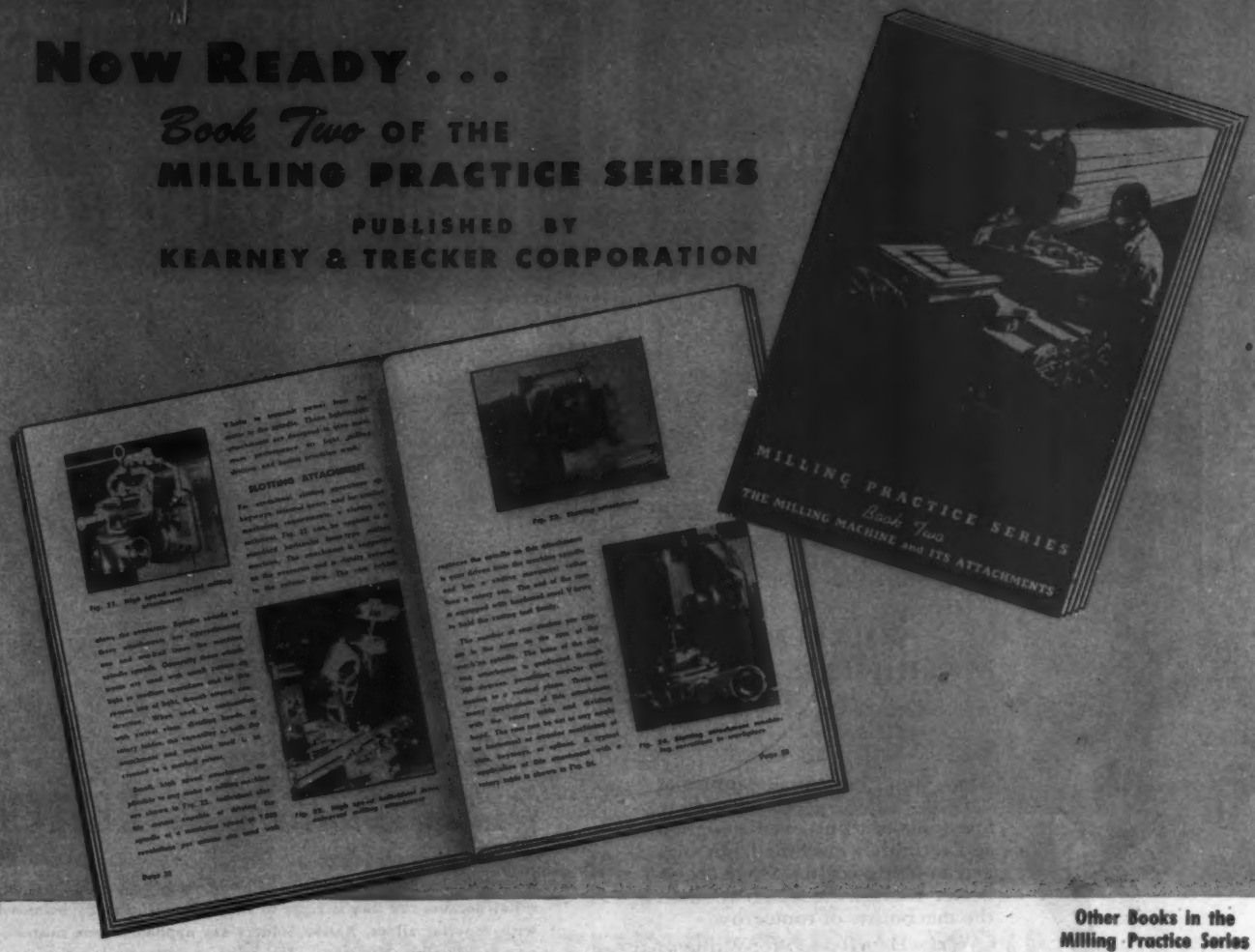

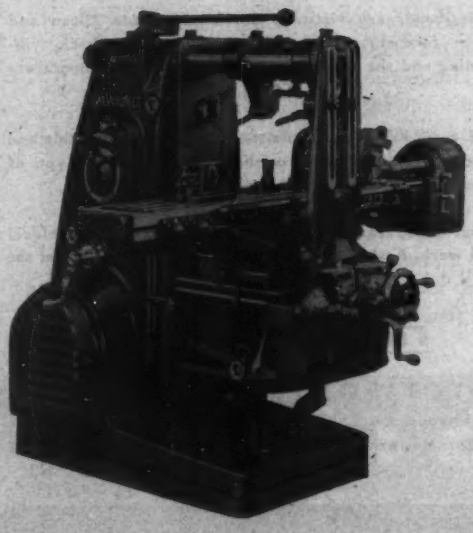

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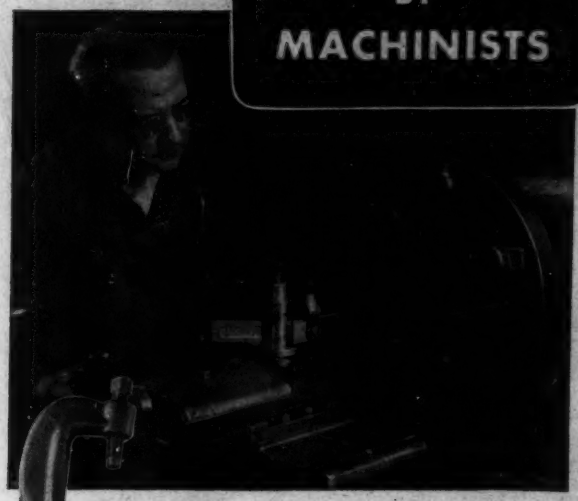

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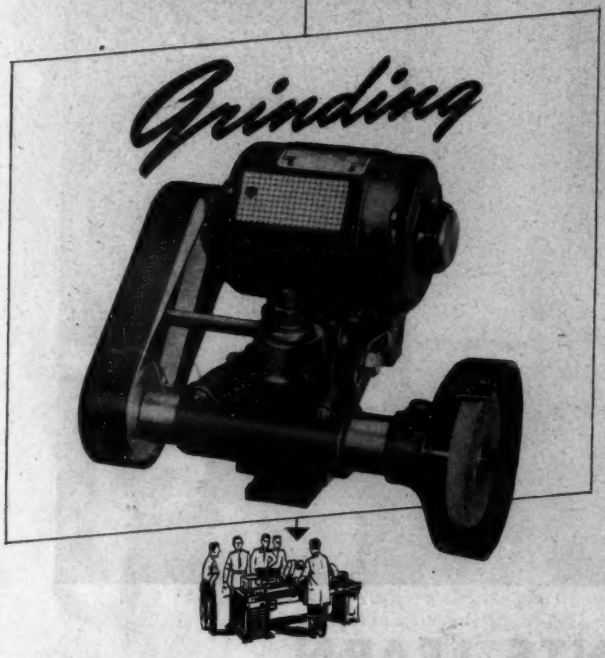

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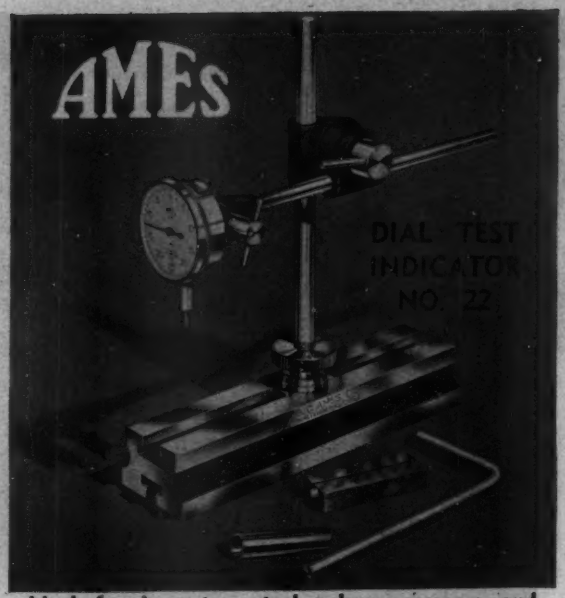

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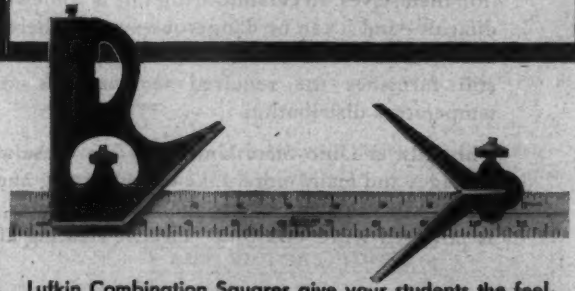

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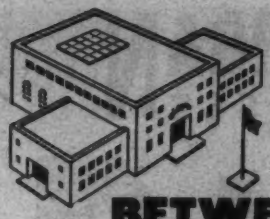

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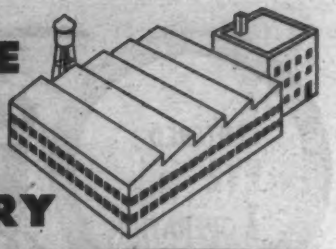

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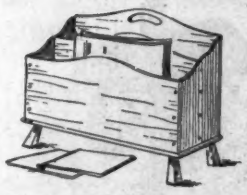

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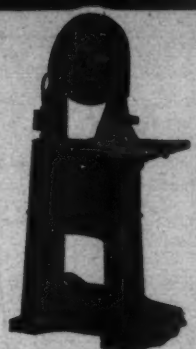

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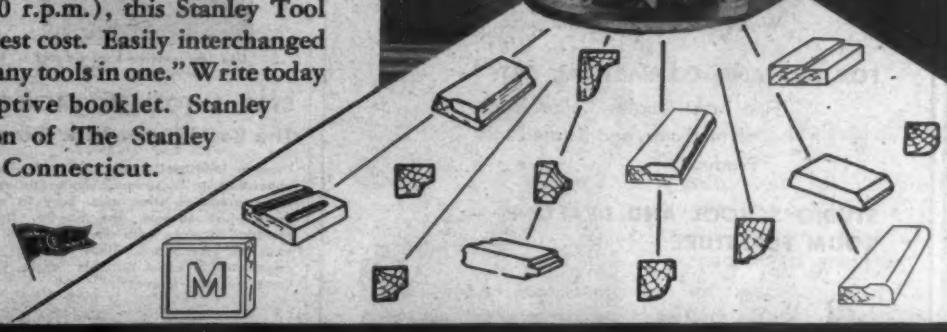

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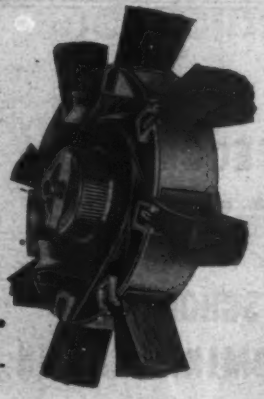

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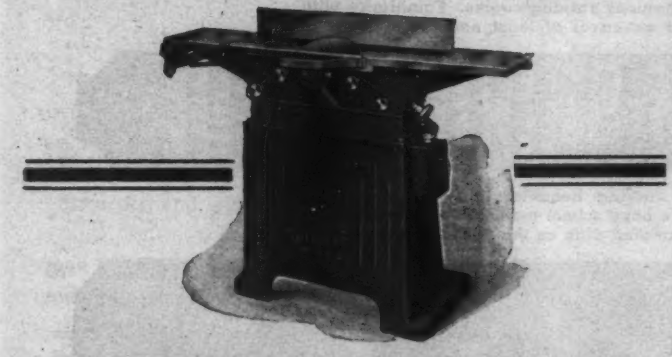

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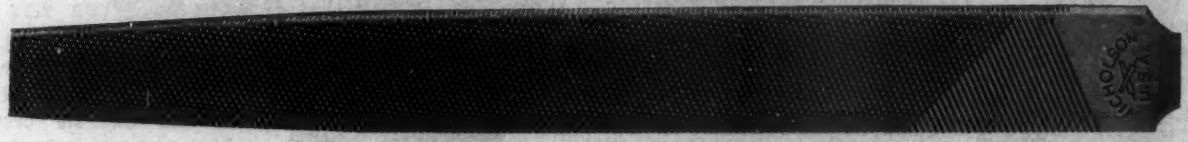

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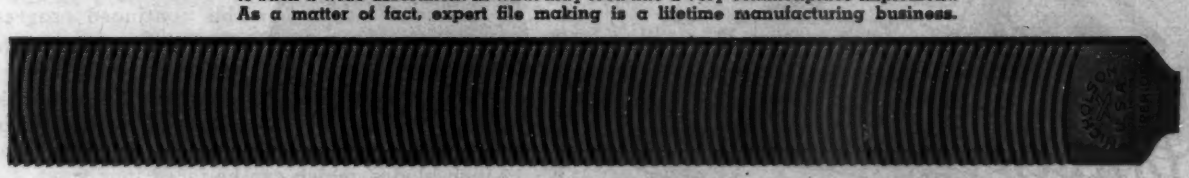

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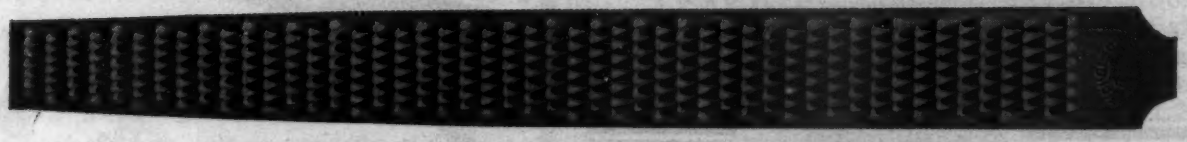

important. An understanding of its varying behavior in its different sizes and cuts will then follow naturally. We hope school managements and instructors will make good use of such educational aids as the Nicholson book, "File

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The Audio-Visual Instruction Service Division will be headed by Vernon G. Dameron, who was formerly with the army air forces at Chanute Field, Ill. It is expected that much of the surplus audio-visual equipment, supplies, and materials may be made available for school use.

The Travel Service Division will be headed by Paul Kinsel, now with the U. S. Office of Education. It will be his task to see that N.E.A. members, on their travels, will get the greatest educational, cultural, and social returns from them.

American Education Week

The week of November 11 to 17 has been designated as American Education Week for this year. All teachers should take an active interest in the observance of this annual educational custom, so that President Harry S. Truman's suggestion ", . . let us resolve as individuals and as a people, progressively to develop our schools as the basic instruments of freedom, democracy, and human betterment" may become true.

This Month's Cover

The original of the picture on this month's cover shows a glider about to come in for a landing. See the article on page 415. Mr. Wesley B. Hammond, author of the article has taught glider construction and gliding for the past three years at York Central School, Retsof, N. Y. Mr. Hammond holds a glider pilot's license, and a private power pilot's license.

Industrial Arts and Vocational Education

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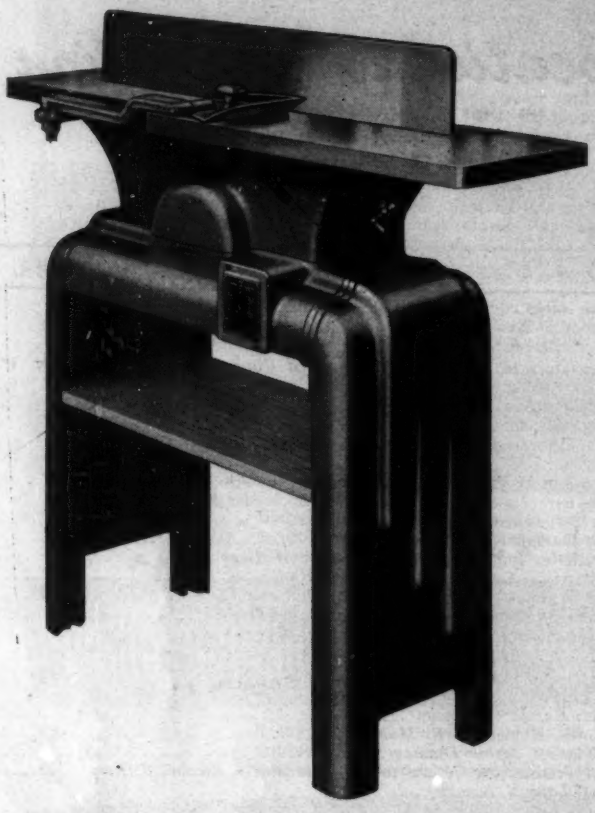

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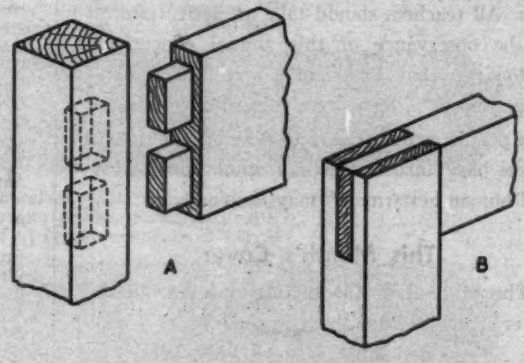

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Practical Nomenclature in the Field of Vocational Curriculum Construction

*H. W. Paine**

Educational magazines and textbooks in the field of teacher training bristle with such terms as "Curriculums," "Programs of Study," "Courses of Study," "Subjects," "Course Outlines," "Lesson Plans," "Job Sheets," "Job Plant Sheets," "Operation Sheets," "Information Sheets," "Report Sheets," and similar titles almost ad infinitum.

Beginning vocational teachers, especially if they have been recruited from industry without having had preparatory teacher training work, are often bewildered by the multiplicity of the terms encountered in their new profession of teaching. It reminds them of their apprenticeship days, and, as then, they sometimes wonder how much of the terminology is necessary, or if it is just used to indicate *distinctions* without *differences;* in other words, is it just hair splitting, or is it only intended to make the textbook writers happy and give the teacher trainers something to do explaining terminology?

However, like the nomenclature of most professions and trades, there are quite sound reasons back of the multiplicity of terms used in connection with vocational education curriculum construction activities. What appears to the beginner to be a veritable confusion of tongues of a Tower of Babel is really based on sound, logical, and necessary discriminations of meanings.

The objects of this brief article are to help clarify the meanings of the myriad of terms used in curriculum construction work, especially in the field of vocational education, and to establish logical, practical, and consistent groupings of terms that will help eliminate the confusion now surrounding the use of many of them.

Although the explanations and definitions presented, perhaps, may not always meet all the requirements of meticulous and precise English, and sometimes may not follow the exacting rules of dictionary making, they should do much to eliminate the confusion existing in the minds of many beginners in the field of vocational education. These definitions and explanations present the most commonly used and logical meanings of all the terms described. In several instances disagreements of authorities will be briefly analyzed, and the reader will be left to draw his own conclusions as to the nomenclature practice he wishes to follow.

No attempt will be made to present instructions on how to write the various types of instructional materials defined; however, the various elements that must be included in the different types of instruction sheets are listed in some detail to help clarify the distinguishing features of each sheet.

*Professor of Vocational Education, University of Cincinnati; and Director of Vocational Teacher Improvement Service for South-Western Ohio.

Program of Studies

If we are to follow recommended pedagogical procedure and go from "wholes to parts," let us start with the term, *Program of Studies.* Most writers establish this term as the dominating or top ranking caption. Thus, the *Program of Studies* in a vocational school could be made up of the school's machine curriculum, automotive curriculum, electrical curriculum, printing curriculum, and the like. Therefore, the program of studies could be defined as the name given to the entire set of curriculums taught in the school. In diagram form the relationships would appear as in Figure 1.

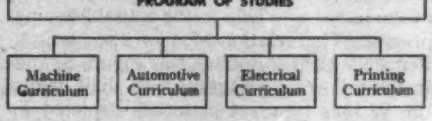

Fig. 1. Relationship of the program of studies to its curriculums

Curriculum

As the program of studies of a vocational school is made up of the various trade curriculums of the school, in a like manner each *curriculum* is made up of its various courses of study. For example, the automotive curriculum in a vocational school's program of studies is made up of various courses of studies such as the automotive shop practice course, the automotive mathematics course, the automotive science and trade information course, automotive blueprint reading and sketching course, and other courses in the general educational field such as American history, and English. Figure 2 discloses the relationship quite clearly. Thus, the *curriculum* of a vocational school could be defined as the name given to the set of courses taught in connection with the trade field represented by a given curriculum.

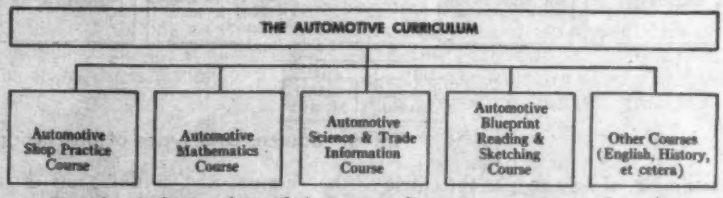
THE AUTOMOTIVE CURRICULUM
Automotive Shop Practice Course
Automotive Mathematics Course
Automotive Science & Trade Information Course
Automotive Blueprint Reading & Sketching Course
Other Courses (English, History, et cetera)

Fig. 2. Relationship of the curriculum to its courses of study

Courses of Study

The program of studies is built up of curriculums; the curriculums are built up of courses of study, and most authorities hold that *courses of study* are, in turn, built up of subjects. They prefer to refer to machine-shop practice for grade 11, for example, as a *subject* in the *shop practice course of study for grades 11 and 12.* This conception holds that a *course of study* includes *all* materials taught in that one category of work.

A two-year vocational automotive mathematics *course* would thus be made up of two *subjects,* viz., automotive mathematics for grade 11, and automotive mathematics for grade 12. Unfortunately, considerable confusion exists in this area, since other authorities reverse the above meaning of *subject* and *course.* However, giving the term *course* the dominating position is probably the preferable procedure. Still others in vocational work disregard the word *subject* entirely, using the term *course* for single or multiple year divisions of one phase of a curriculum.

If we accept the course-subject nomenclature, however, with *course* as the dominating term, we would have chart relationships such as depicted in Figure 3.

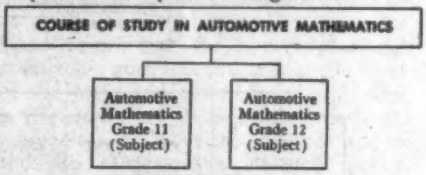
COURSE OF STUDY IN AUTOMOTIVE MATHEMATICS
Automotive Mathematics Grade 11 (Subject)
Automotive Mathematics Grade 12 (Subject)

Fig. 3. Relationship between course of study and subject

Thus, a *course of study* could be defined as the material included in a given phase or part of a curriculum. It may consist of one or more definite subject areas, usually

based on time elements, for vocational workers seem to be using the term *subject* as closely connected to *grade levels*, cutting across courses of study. For example, in vocational literature we encounter time and credit distribution charts such as Chart I for grade 11 of a machine curriculum. In that chart, quite obviously, machine science and machine mathematics for grade 11 are definite parts of *courses* in machine science and machine mathematics.

CHART I. Machine Curriculum Time and Credit Distribution Chart — Grade 11

Subjects	*Hrs. per week*	*Unit credits*
Shop subject		
Machine-shop practice	15	1½
Related subjects		
Machine science	5	1
Machine mathematics; machine blueprint reading and sketching	5	1
Other subjects		
English	5	1
Total	30	4½

Note: Each subject listed in the chart is a part of a two or a three years' course. If the subjects were to be outlined separately, they would be titled Machine-Shop Practice, Grade 11; Machine Science, Grade 11; Machine Mathematics, Grade 11, and the like.

Chart I clearly carries out the philosophy that conceives *subjects* to be subsidiaries of *courses* as was depicted in Figure 3. Machine science (subject) for grade 11 is really a part (the eleventh-grade part) of the complete course of study in machine mathematics for grades 11 and 12. Likewise, the shop subject and machine-shop practice (for grade 11) is obviously part of the complete two-year machine-shop practice course, assuming, of course, that the curriculum and courses are two years in length.

The relationships of the many curriculum construction terms discussed up to this point and on previous figures are shown in one diagram in Figure 4.

While the relationships depicted in Chart I may at times *seem* to conflict with those outlined in Figure 3, there is, in fact, no such conflict. This is shown clearly on the more elaborate breakdown of Figure 4.

Relationships Between the Teachers' Teaching Materials and the Learners' Learning Materials

Two distinct types of teaching materials are found in the tool kit of every good trade teacher. One type consists of the trade analysis, course outlines, and lesson plans that are the teacher's personal property and might be classified under the general heading of *blueprints of the work to be put over*, or *memoranda of what is to be taught*. The other group of materials goes into the hands of the learners to help in the actual learning process. The relationships of the various items are clearly disclosed in Figure 5, and in the following paragraphs we shall define the various types of materials depicted in that Figure, and outline their usual areas of application.

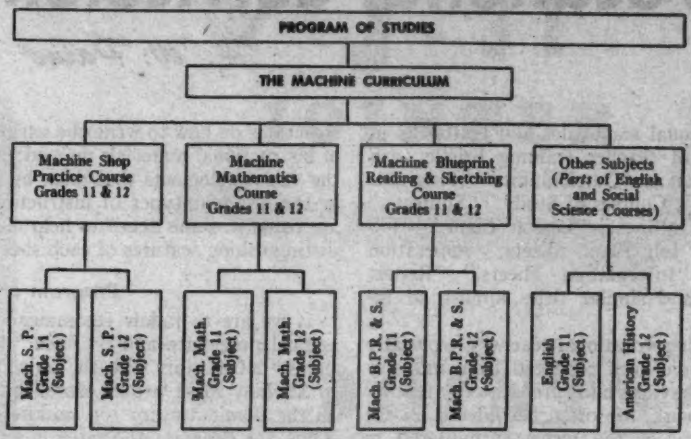
PROGRAM OF STUDIES
THE MACHINE CURRICULUM
Machine Shop Practice Course Grades 11 & 12
Machine Mathematics Course Grades 11 & 12
Machine Blueprint Reading & Sketching Course Grades 11 & 12
Other Subjects (Parts of English and Social Science Courses)
Mach. S. P. Grade 11 (Subject)
Mach. S. P. Grade 12 (Subject)
Mach. Math. Grade 11 (Subject)
Mach. Math. Grade 12 (Subject)
Mach. B.P.R. & S. Grade 11 (Subject)
Mach. B.P.R. & S. Grade 12 (Subject)
English Grade 11 (Subject)
American History Grade 12 (Subject)

Fig. 4. Relationships between program of studies, courses, and subjects

Trade Analysis: As clearly indicated in Figure 5, the trade analysis is the source from which all other vocational instructional materials stem. Trade analysis was brought into the vocational educational field by two early workers in the movement, viz., the late C. R. Allen, former Superintendent of Instructor Training, United States Ship Building Emergency Fleet Corporation, World War I, and later Editorial Consultant of the Federal Board for Vocational Education, and R. W. Selvidge, formerly Professor of Industrial Education, University of Missouri. From their work we have developed the following definition of trade analysis: Trade analysis is a systematic breaking down of a trade into its elements of skill and items of related information for determining the instructional content of the trade. Figure 6 shows a sample group of chart headings used in trade analysis work.

Course Outlines: Course outlines may be very informal and sketchy, or very formal and detailed. They may be written in topical form, or in separate-lesson-unit form. In the more formal types of course outlines, methods of teaching, sources of materials, and visual aids may all be listed for each unit.

A complete course outline, as it is usually produced by vocational teachers, consists of the following elements:

1. Title page
2. Introduction or foreword
3. Statement of objectives
   a) General
   b) Specific
4. Bibliography of references
   a) Texts and trade literature
   b) Visual aids

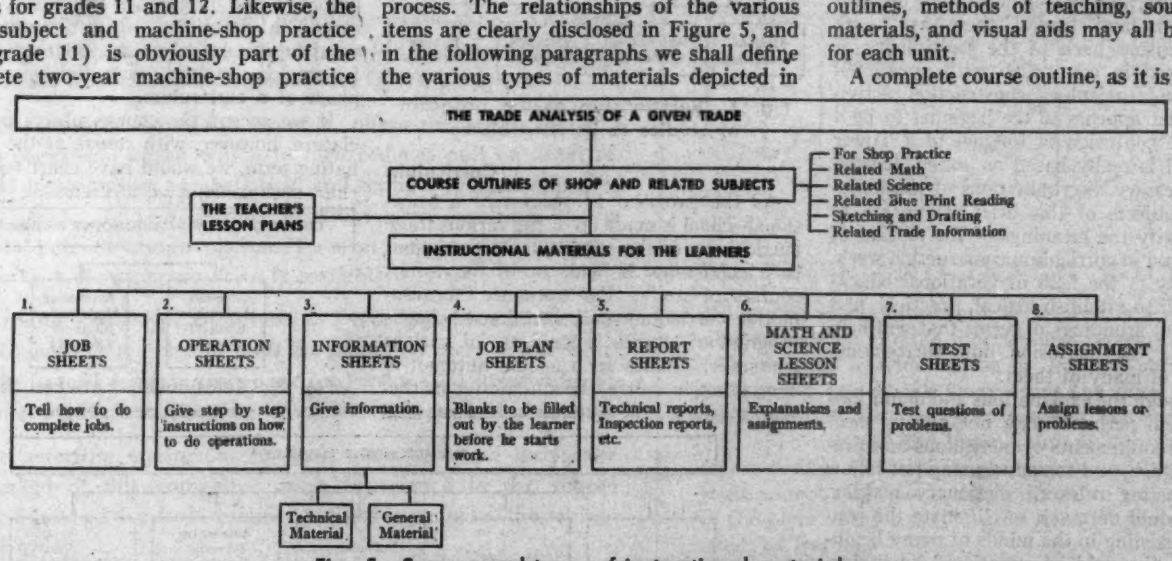
THE TRADE ANALYSIS OF A GIVEN TRADE
THE TEACHER'S LESSON PLANS
COURSE OUTLINES OF SHOP AND RELATED SUBJECTS
For Shop Practice
Related Math
Related Science
Related Blue Print Reading
Sketching and Drafting
Related Trade Information
INSTRUCTIONAL MATERIALS FOR THE LEARNERS
1. JOB SHEETS — Tell how to do complete jobs.
2. OPERATION SHEETS — Give step by step instructions on how to do operations.
3. INFORMATION SHEETS — Give information.
4. JOB PLAN SHEETS — Blanks to be filled out by the learner before he starts work.
5. REPORT SHEETS — Technical reports, Inspection reports, etc.
6. MATH AND SCIENCE LESSON SHEETS — Explanations and assignments.
7. TEST SHEETS — Test questions of problems.
8. ASSIGNMENT SHEETS — Assign lessons or problems.
Technical Material
General Material

Fig. 5. Sources and types of instructional materials

5. Topical outline of course or unit outline, or both
6. Instruction unit record

Perhaps a few words regarding the titling of course and subject outlines would be apropos at this point. Briefly, the title should clearly indicate the curriculum to which the shop or related course or subject belongs, as well as the content of the course

11. Memoranda for improving this lesson
12. Absence record for make-up

Obviously, a lesson plan, such as that just outlined, should help a teacher greatly to carry through a lesson in a workmanlike manner. He would never come to class unprepared, forget to cover important points, or neglect to get back from lesson detours.

Instruction Sheets and Lesson Sheets: These sheets are sometimes titled "How to Make a V Block," "How to Make a Red Cross Flag," and the like. Personally, the writer prefers the heading containing the gerund form, e.g., "Making a V Block," "Making a Red Cross Flag," etc.

A job sheet may consist of many sheets including sketches and blueprints if needed.

The Operation Sheet: The operation sheet is another shop instruction unit and is quite similar to the job sheet just described. However, there are two different schools of thought as to just the area of work that should be conveyed by an operation sheet. One school holds that it should cover one of R. W. Selvidge's "Unit Operations," which may be defined as a part of trade occurring again and again in the same form. Thus, we would have operation sheets on such unit operations as centering stock, straight turning, chasing threads, making pie crusts, sewing button holes, and the like. The elements making up the operation sheet would be identical with those outlined for the job sheet (which see) except the material presented would deal with the operation involved instead of the job.

Another conception of the operation sheet held by many shop instructors is that it should follow in structure and content a similarly named production sheet used in industry. It would describe procedures or steps used in getting out a job or a part of a job. Thus, in some cases it would almost duplicate a job sheet, and in others it would more closely simulate our previously outlined operation sheet.

The writer prefers limiting the term *operation sheet* to the basic *unit operations*, and using the term *job sheet* for complete pieces of work. However, where vocational school graduates are obviously going into industries, using the industrial type operation sheets, such students should be made acquainted with the industrial type operation sheet before graduation.

Job Plan Sheets: The job plan sheet is a blank to be filled out by the learner before he starts work. It is particularly valuable when operation sheets are used as the means of shop instruction. Job plan sheets require that the student *plan and organize* his work before starting. He must list the tools and materials he will need and the steps or operations he will perform. It is *one* school device that requires him to think his shop problem through before starting work.

Since the job plan is really a job sheet written by the student, it, of necessity, follows the form of job sheets. However, the objective, introductory information, and question elements are usually omitted. The sheet, therefore, usually provides blanks for:

1. Title and date of work
2. Tools and materials
3. Sketch of part to be made
4. Steps or operations
5. Safety and precautions
6. Student's name
7. Instructor's O.K.

SHOP INSTRUCTION DIVISION				RELATED INSTRUCTION DIVISION			
Jobs Work-Units, or Operations	Steps	Materials & Tools	Safety, Precautions and Information Points	Mathematics	Trade Information and Science	Blueprint Reading, Sketching & Drafting	Trade Terms

Fig. 6. Trade analysis chart headings

or subject under consideration. Thus, Automotive Mathematics, Grade 11; Machine Science, Grade 12; Sheet-Metal Shop Practice, Grades 11 and 12; and Wood Patternmaking, Blueprint Reading and Sketching, Grade 11, are subject and course titles that indicate *definite areas* of instruction in *definite courses* or in *definite curriculums*, clearly and concisely. Such titles are obviously far superior to such vague terms as "Industrial Mathematics for Machinists I," "Applied Science I," Practical Mathematics II," and the like.

Lesson Plans: The lesson plan, in its formal form at least, is perhaps used infrequently by vocational teachers. Why this is true is rather a mystery because obviously any lesson to be taught, any piece to be made, any house to be built, must be planned. These latter material items are usually made from blueprints. If the vocational teacher would only view the lesson plan as the blueprint of the lesson to be taught, he might be more inclined to develop and use them. Yes, the lesson plan is the teacher's blueprint. It contains memoranda of the points to be put over, and the materials used in the lesson. It remains in *his* hands and is not intended to go into the hands of the students. Its objectives are stated in the form, *to teach*, not *to learn;* for example, a lesson plan concerning centering stock would have its objective stated, "To *teach* how to center stock." The *to learn* form is appropriate for student instructional materials, but is not used on lesson plans.

As used by vocational teachers, although great variations will be found, lesson plans usually contain the following elements:

1. Heading
2. Topic or lesson title
3. Statement of objectives—"To teach," "to develop," etc. (Sometimes includes habits and attitudes to be developed as well as skills and knowledge)
4. Tools, equipment, and supplies required (if shop or science)
5. Texts, references, and visual aids
6. Preparatory points for the lesson
7. Presentation points (demonstration, etc.)
8. Student assignments
9. Student testing materials or questions

Often spaces are provided for the following items:

10. Next assignment notes

These terms are used rather loosely in vocational education circles. The titles are rather general and basic in character; thus *all* shop or classroom instruction sheets *could* be classified under these general headings. However, rather general practice is confining the use of the terms *instruction sheet* and *lesson sheet* to the related subject and general subject teaching fields, and lesson sheets and instruction sheets are written for such courses as related mathematics, related science, English usage, and the like. Furthermore, the term *sheet* itself is used loosely in all nomenclature regarding instructional materials in the vocational education field. It refers to the instruction *unit* under consideration which may vary from a single loose sheet to 25 pages or more that may be stapled together with elaborate illustrations, table of contents, and a cover page. Thus *sheet* really means *unit* rather than a sheet of paper.

The elements of a lesson sheet or instruction sheet vary greatly depending on the related subject to which they belong. In general, these sheets consist of:

1. Heading
2. Topic or lesson title
3. Statement of objectives ("To learn," etc.)
4. Equipment supplies, etc. (if science)
5. Texts and references
6. Introductory information
7. Explanation, sample solutions, and (in case of mathematics sheets) the development of a rule to be followed
8. Assignments
9. Test questions

Job Sheet: A job sheet is a shop instruction unit telling how to do a *complete job* such as "Making a V Block," "Making a Red Cross Flag," "Making an Apple Pie," "Making a Planer Jack." It usually consists of the following elements:

1. Heading
2. Title
3. Objectives
4. Introductory information
5. List of tools and materials
6. Procedure (usually step by step instructions on how to do the job)
7. Sketches (as needed)
8. Safety (concerning worker protection) and precautions (concerning machine and materials protection)
9. Questions (to produce thinking and drive home the important points)

Most job plans usually carry a provision for *Instructor's O.K.* (item 7) to insure that the work plan of the student is approved by the instructor *before* work is started. Sometimes spaces are also provided for starting time, finishing time, and total time required in order to keep track of the time elements involved in the student's work.

The possibilities of the job plan are great, especially with advanced students. Its use is advisable in practically all shop teaching situations.

Information Sheets: The information sheet concerns units of information that the learners need to supplement their shop experiences. They usually explain construction of equipment, functions of parts, types and nomenclature of materials, and the like, and do not concern the skills of the trade since the skills are taught by the job or the operation sheets. Information sheets usually consist of the following elements:

1. Heading
2. Title
3. Objectives
4. Information
5. References
6. Questions

The use of information sheets makes the shopwork much more meaningful to the students, and enables the up-to-date teacher to keep his group informed on new developments in the trade fields.

Report Sheets: Result Sheets: These sheets usually concern such subjects as the recording of data of test runs of engines, generators, and other units. They can also be used to aid the study of the construction of machines, units, and condition of equipment. Obviously their form will vary greatly. They usually consist of the following elements:

1. Heading
2. Title of test or name of equipment being checked
3. Blanks for report of items to be observed
4. Space for remarks or summary

Report sheets and result sheets are excellent devices to encourage student study.

Assignment Sheets: Work Sheets: As their names imply, assignment sheets and work sheets deal with definite student-work allotments. They usually, but not always, are connected with related mathematics and related science subjects. These sheets differ from the mathematics and science lesson sheets in that they usually carry little or no explanations of any kind. They simply *assign* the work to be done. They are closely related to report sheets and result sheets, already discussed, and, like such sheets, they should make their requirements clear to the learner.

Test Sheets: Test sheets, as used in trade and industrial teaching, need no detailed description. They usually concern checking the learner's knowledge regarding technical materials related to the shopwork under consideration. However, they may concern testing manipulative knowledge by requiring the writing out of the steps of a job in their proper sequence, or rearranging steps in a job that have been listed without regard to order. They vary greatly in form according to the situation in which they are to be used and the person writing them.

Summary

In the material presented on the preceding pages an attempt has been made to explain and define the terminology used in connection with vocational curriculum revision work. While it is realized that in this brief article, only the surface has been scratched, it is hoped that the definitions and explanations given concerning the numerous terms used in this most important educational area will prove helpful in clarifying the thinking of beginning teachers in the field. Much additional work needs to be done, and obviously much is to be gained by a general agreement on the meaning of the terms used in vocational curriculum revision activities. This is particularly true in instruction sheet writing and in the related subjects areas of the vocational field where a clear understanding of correct titling of courses and sheets, of the related subject needs, and a realization of the necessity for correlating the related subject instruction with the shopwork are absolutely vital to the success of any vocational teaching effort.

Rx: A Hammer and a Saw

*Verne C. Frykluna**

Back in 1918, some soldiers were aimlessly sitting about a hospital ward waiting to get well. A few friendly games of jawbone poker were in progress, but most of the patients were simply chasing Indians via "Western" magazines. Presumably, they were occupying their time satisfactorily according to the then accepted rules of convalescence. One day a lady entered the ward and offered to teach them how to weave. She thought they could more profitably occupy their time. The boys liked the idea of "doing something" but they didn't warm to weaving. That was all right for old ladies and Persians, they reasoned, so after a conference they courteously declined. Later, they mulled over the problem. Sure they'd like to work if they could use materials men normally use in civilian life. Yes, they decided, there might be a great deal of participation.

But America fought a short World War I, and it was over before occupational therapy, as an aid to convalescence, could be developed fully.

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Again in 1941 this country was plunged into war and more men were wounded and hurt. Again they played jawbone poker. Western magazines had lost their appeal, but were replaced by "comics" in soldiers' reading preference. Then the Army Air Forces revived the almost forgotten interest in occupational therapy for convalescent patients.

The new occupational therapy embraces all phases of education with particular emphasis on shops. The program in the AAF Convalescent Hospitals is under supervision of the Office of the Surgeon, Personnel Distribution Command with offices in Louisville, Ky. It is established to provide opportunities for patients able to be out of bed to participate in activities quite like those to which they are normally accustomed in civilian life. It is a rehabilitation program for health, rather than for occupation. Occupational rehabilitation is a function of the Veteran's Administration and the schools—a job to be done when the man has been discharged from the service.

Educational Activities Offered

When a patient has recovered sufficiently to leave his bed, every possible type of educational activity is provided. Thus he may choose for three hours of participation each day. Among these activities are shopwork, academic studies, music, agriculture, and art. Attendance is 3 to 1 in favor of the shops. This is according to patient interest and not by other influence. He must also participate in two hours of physical reconditioning. A list of educational activities available for his choice is as follows:

1. *General Machine Shop:* machine shop, sheet metal, ornamental ironwork, forging, metal spinning, plastics, gas and electric welding, art metal and metal model making.
2. *General Woodshop*: hand woodworking, cabinetmaking, wood turning, carpentry, patternmaking, wood-model making, carving and inlaying, finishing.
3. *General Electricity*: appliance repair, house wiring, radio repair, telephone, telegraph, electronics.
4. *Graphic Arts*: silk screen, commercial art, sign writing and painting, architectural drawing, machine drawing, blueprinting, printing, multility, multigraphing.
5. *Crafts:* leathercraft, jewelry, linoleum block carving, art metal, lapidary, plastics, ceramics, etching, needlework, weaving, fly tying.
6. *Agriculture*: animal husbandry, poultry husbandry, farm and ranch management, horticulture, landscape architecture.
7. *Photography*: taking pictures, film processing, enlarging and copying, photo-

Machine shop and general metals shop

stating, portraiture, news and industrial photos.

8. *Auto Mechanics*: service garage equipment is provided at all convalescent hospitals so patients can work on their own cars. Auto mechanics does not permit instruction of the kind possible in other shops.

9. *Fine Arts*: painting, sculpture, music, dramatics.

10. *Business Subjects*: typing, vari-typing, bookkeeping, business machines, shorthand.

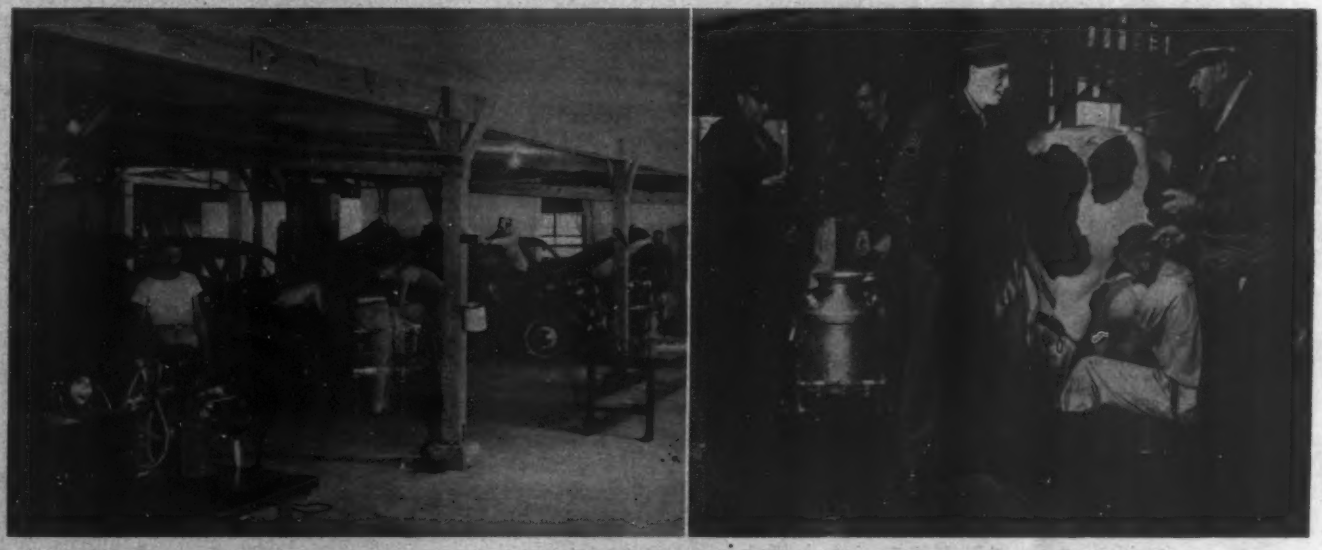
11. *Academic activities* such as normally offered in a high school or college. These are usually conducted through the United States Armed Forces Institute as well as in

popularity. Many a young man is looking forward to owning a small airplane and desires to study CAA regulations, navigation, and the like in preparation for it.

The three hours of educational activity are prescribed for the patient by the physician. It is part of the medical routine, and a must. The patient has a choice of activities but whatever he chooses, once he has started, he must continue, unless, of course, it is determined medically that his program should be changed. He may then be assigned to lighter work. Or perhaps he has a disability that requires utilization of particular shop equipment that can "team" with the physical therapy department. He is assigned

things from various of the world's materials is interesting to most people. Persons who are not ill but who desire relaxation and retreat from the routine of their daily work have hobbies that they pursue. It takes the mind off their worries. It has mental therapeutic value. The education program in the convalescent hospital provides similar opportunities for interesting activity of mental therapeutic value as well as for special physical exercise.

There are also certain vocational guidance and refresher training values to be gained from the convalescent hospital educational activities program. There are patients who would like to try various of



Auto-mechanics class

Class in dairying

formal classes under experienced instructors. Credit is arranged, especially when correspondence courses are involved.

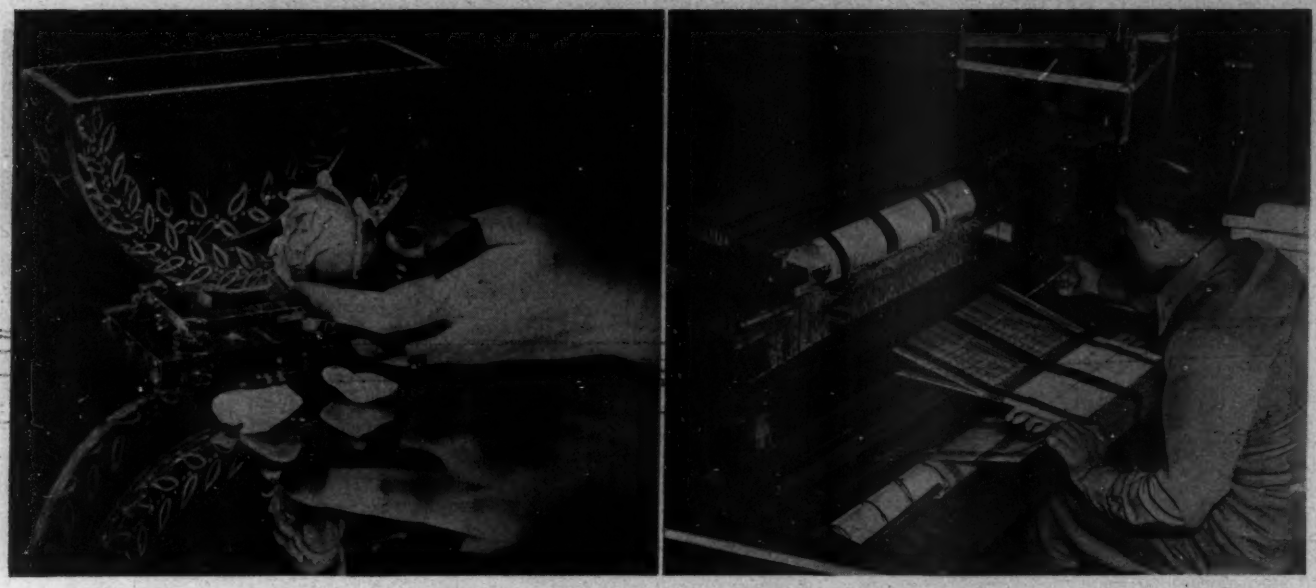
Courses in aircraft mechanics have not been popular. Aeronautics courses such as navigation, link trainer, meteorology, and CAA regulations, however, are growing in

to some type of work that will give purposeful exercise, interesting exercise for the disability in question.

Physical and Mental Therapy

It should not be inferred that physical therapy is the only objective. Creating

the shop activities with a view to determining aptitudes for possible subsequent training. Furthermore, there are a good many mechanics in the air forces who have been



Plastic project as well as a masterpiece of photography; weaving carpets

away from their occupations for many months, and they have opportunity to again work at their occupations with the equipment provided them, a chance to gain confidence for ultimate return to the old job; a sort of refresher experience.

One AAF Convalescent Hospital has made arrangements with local school authorities to give instruction in high school academic courses, and to date, 47 persons have received high school diplomas. The interrupted high school education of these patients was completed while convalescing. These patients might have been doing other things less purposeful, but it is reasonable to assume that they regained their health as quickly as they might have by any other means, and they obtained their high school diplomas in the process; that should be a good deal.

One young Pfc. in a convalescent hospital made a baby bed. He was proud to announce that he was to be a father and was sending the bed home as a surprise. Undoubtedly this project must have had dual therapeutic value. Certainly the home folks must have been thrilled.

There are many instances of vocational and avocational training in AAF convalescent hospitals that could be cited. None of them, however, are intended directly for occupational preparation. All activities are provided to help the physician in his efforts to help the patient help himself get well. If the patient learns, as in the hospital where patients completed high school courses, well and good. All concerned should be satisfied. Even for the parents of these boys such activities should have a very special meaning of worth.

These boys have given all but their lives in a war and now they are home again. We owe them much. The opportunity of working in all kinds of world materials while convalescing should be a rightful privilege of considerable therapeutic value, yet it has many other values as set forth in the foregoing.

The Cost of This Work

Now let us consider the cost, if there is a cost that can be measured in terms of the real gains. As earlier stated, there are shops of all kinds: machine shops, woodworking shops, electrical and radio shops, craft shops, drafting and art rooms and print shops. The machine shop contains all equipment necessary for processing any kind of metal including facilities for welding, sheet-metal working, forging and pipe fitting as well as the usual machine-shop equipment. The equipment is of the latest kind. All this equipment is cost free to the hospital. It is surplus. It was paid for in the make-ready for the fighting. That training period being over, the equipment is made available for the occupational therapy program. If it were offered for sale on the market, the return would be very low. But the return is high—doubly high—if it is used in aiding in the recovery process. After we are through using such equipment for occupational therapy, it can be sold at a price probably no less than it would command if sold before such use. If only one patient uses a given machine, but, of course, more do, its worth is justified if only the space on which it stands serves as a place for storage. Supplies are obtained in the same way as the equipment. The cost, therefore, is not added to the tax burden beyond that which was necessary for purchase in the make-ready for war. Some day the equipment will be sold, but there is additional gain, and certainly no further loss by utilizing it in the occupational therapy program.

Selection of instructors should be of interest. Instructors are secured from among returnees. Patients themselves who know a craft frequently derive much satisfaction from teaching. Some voluntary assistance is obtained from communities near the hospital. In one instance, for example, a local art colony gave much instructional assistance in art classes. In another, local high school teachers volunteered their services. On the whole, however, the instructing has been done by returnees.

It is a rehabilitation program, not rehabilitation for occupational purposes, but rather for recovery of health. The job of rehabilitating for civilian occupations is a job for the Veteran's Administration. That is set by law. The armed forces do not do vocational training for civilian life. On the other hand, this program cannot be carried on in a puttering manner either. There must be system and organization lest someone gets hurt and there be much waste of both material and time. Good instruction, therefore, is necessary. In fact, similar precautions are taken in the public schools where pupils are assumed to be in good health and this program dealing with patients deserves even better instruction than given in the public school.

Numerical evidence to show that the education program has contributed to the recovery of a patient is difficult to obtain inasmuch as so many services are involved in the care of the patient. However, all services in a hospital are prescribed by the physician in some way. The AAF physicians have added to their wide scope of facilities for treating patients by establishing the educational program in the Convalescent Hospital. It is an innovation in occupational therapy.

A farm home or farm building catches fire every 15 minutes during the day in the United States, and the cost of these farm fires totals around a quarter of a million dollars each day. — *U. S. Dept. of Agriculture.*

The first iron-making venture in what is now the United States was located in Virginia. The attempt was halted when Indians massacred the ironworkers and destroyed the furnace. — *Steel Facts.*

HOW DO YOU Compare?
SHOUTER
MUMBLER
WHISPERER
CLEAR SPEAKER
SPEED DEMON
"DOPEY"
SEAT YOUR CLASS SO
ALL CAN SEE AND HEAR
APPLICATION
THE TRAINEE DOES THE JOB UNDER CLOSE SUPERVISION OF INSTRUCTOR
EXAMINATION
THE TRAINEE IS TESTED. PERFORMANCE TESTS ARE BEST FOR SKILLS-WRITTEN TESTS FOR INFORMATION
WRITTEN TEST
PERFORMANCE
DISCUSSION
TRAINEE AND INSTRUCTOR ASK QUESTIONS AND STRESS KEY POINTS
HI-YA BUB!
INSTRUCTOR
DON'T BE TOO CHUMMY WITH THE TRAINEES
INSTRUCTOR
POOR SEATING PLAN
GOOD SEATING PLAN
INSTRUCTOR
SUCCESS
Like Steppingstones
THE JOB TO BE TAUGHT MUST BE DIVIDED INTO WELL SPACED STEPS
DO YOU MAKE HUMOR EFFECTIVE?
USE HUMOR THAT WILL
1. MAKE THE LESSON INTERESTING.
2. PUT OVER AN IDEA.
3. "BREAK THE ICE."
STEPS IN TRAINING MEN
PREPARATION
THE INSTRUCTOR PLANS HIS LESSON AND CHECKS HIS TRAINING AIDS.
EXPLANATION
THE INSTRUCTOR EXPLAINS ABOUT THE SKILL TO BE LEARNED.
DEMONSTRATION
THE INSTRUCTOR SHOWS AND TELLS AND ASKS QUESTIONS.
STEP I. CLEAN THE SURFACE TO BE SOLDERED.
SOLDER WILL NOT STICK TO DIRT OR GREASE AND THE HEAT AND FLUX WILL NOT REMOVE ALL OF IT.
TELL THEM WHY

Teaching techniques, Lt. (jg.) H. C. Rose, USNR, Little Creek, Va.

THE TRAINEE SHOULD ALSO BE "WARMED-UP"

TELL AND SHOW HIM:

1. WHAT HE IS TO LEARN.
2. HOW HE CAN USE THIS INFORMATION AND SKILL ON THE JOB.
3. WHAT HE WILL DO IN SHOP OR CLASS TO HELP HIM LEARN.
4. HOW HE WILL BE TESTED.

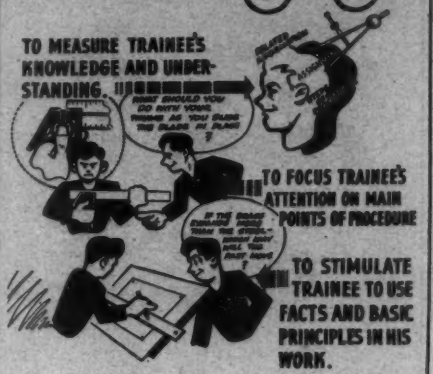
The TRAINEE LEARNS THROUGH HIS SENSES

THE MORE *Senses* HE USES WHILE LEARNING THE *Faster* HE WILL LEARN

USE QUESTIONS

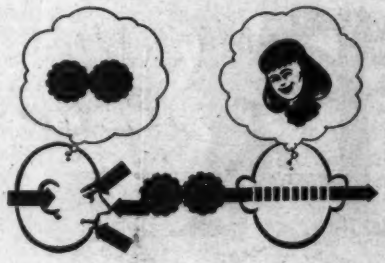
TO GET AND HOLD ATTENTION AND INTEREST.

TO MEASURE TRAINEE'S KNOWLEDGE AND UNDERSTANDING.



TO FOCUS TRAINEE'S ATTENTION ON MAIN POINTS OF PROCEDURE

TO STIMULATE TRAINEE TO USE FACTS AND BASIC PRINCIPLES IN HIS WORK.

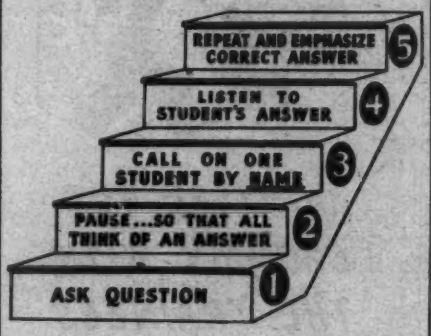


WHICH SIGNIFIES *GOOD Teaching?*

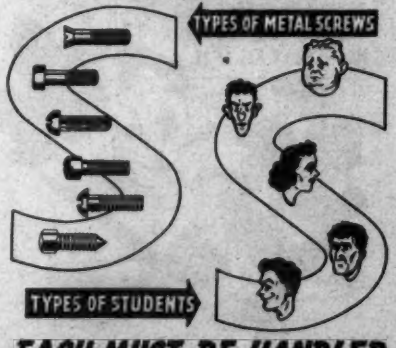
GIVE THE TRAINEE CREDIT FOR GOOD WORK

1. POINT OUT WORK WELL DONE.
2. PRAISE HIM FOR HONEST EFFORT.
3. LET HIM KNOW THAT YOU ARE INTERESTED IN HIS PROGRESS.
4. ACCOMPANY REPROOF WITH PRAISE FOR ASPECTS OF THE WORK WHICH ARE WELL DONE.

STEPS IN *QUESTIONING*



THERE ARE MANY TYPES OF INDIVIDUALS



EACH MUST BE HANDLED IN A *Different Way*

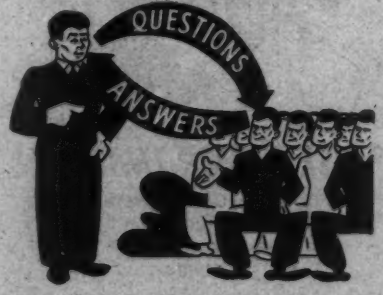
PROPER REPRIMANDING

THE INSTRUCTOR

- IS CALM
- KNOWS AND USES THE FACTS
- CONSIDERS THE FEELINGS OF THE TRAINEE
- TALKS TO THE MAN ALONE
- INCLUDES SOME ENCOURAGEMENT AND PRAISE FOR WORK WELL DONE

MAKES A MAN WANT TO LEARN

Maintain TWO WAY CONTACT *Between* INSTRUCTOR AND TRAINEE



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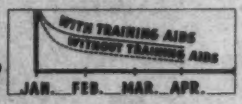
A TRAINEE FEELS
IMPORTANT IF YOU
Call him by name

TRAINING AIDS

TEACH MORE AND SAVE TIME

HOLD STUDENT INTEREST

HELP TRAINEE REMEMBER LONGER

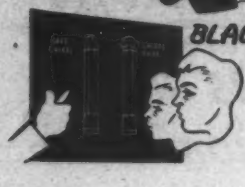


PROVIDE MEANS OF MORE ACCURATE LEARNING

The TRAINING AIDS

RECORDINGS
WHERE SOUND IS NECESSARY

POSTERS
WHERE NO PROJECTION EQUIPMENT IS USED...



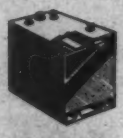
BLACKBOARD
VERY FLEXIBLE.
USED TO DEVELOP IDEAS

THE TRAINEE SHOULD ALSO BE *Measured*

Use:

1. ORAL QUESTIONS
2. WRITTEN TESTS
3. PERSONAL OBSERVATION

The TRAINING AIDS



CUTAWAY
WHERE INTERNAL PARTS MUST BE SHOWN

ACTUAL EQUIPMENT
MOUNTED OR DISPLAYED

WORKING MODELS
WHERE RELATIONSHIP OF MOVING PARTS MUST BE SHOWN
MAY BE LARGE OR SMALL SCALE

The TRAINING AIDS

MOTION PICTURES
WHERE MOTION IS NECESSARY..

FILM STRIPS
TO ILLUSTRATE A LECTURE WITH STILL PICTURES

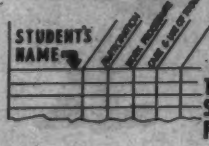
OPAQUE PROJECTOR
WHERE IT IS DESIRABLE TO PROJECT PICTURES FROM BOOKS AND MAGAZINES
TO ENLARGE AND PROJECT SMALL RATHER FLAT OBJECTS

WAYS OF MEASURING TRAINEE PROGRESS

WRITTEN TESTS
TO TEST TRAINEE'S INFORMATION.

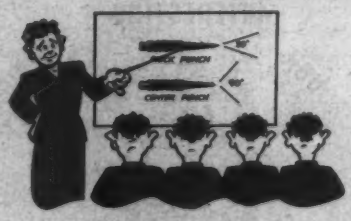
ORAL QUESTIONS
TO TEST TRAINEE'S UNDERSTANDING OF SUBJECT.

PERFORMANCE TESTS
TO TEST FOR SKILLS



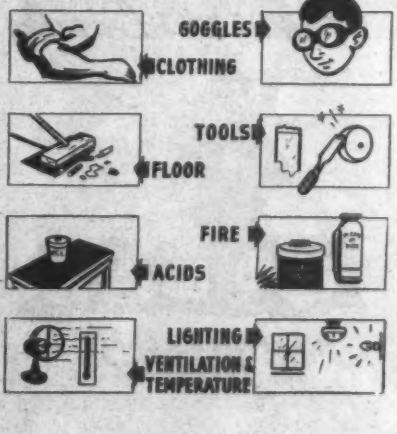
OBSERVATION CHECK SHEETS
TO MEASURE WORK HABITS, SKILLS, OR OPERATIONS FINISHED.

When Using POSTERS OR BLACKBOARD



1. USE A POINTER
2. STAND TO ONE SIDE
3. FACE AND TALK TO THE CLASS

WHAT ARE YOU DOING ABOUT SAFETY



Teaching techniques, Lt. (jg.) H. C. Rose, USNR, Little Creek, Va.

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The Highway to Industrial Peace

*James McKinney**

Who won the war? The men and women in the armed forces—on land, on sea, and in the air. The men and women on the home front—in the home, office, and factory. The overwhelming power of our machines—ships, airplanes, tanks, trucks, bulldozers, bombs, guns, and rifles.

We take off our hats to the genius and superiority of our technical research and production engineering for their magnificent contribution in helping to win the war. But, in doing so we are likely to overlook the other outstanding contributions that have been made by the common workingman. For the first time in history in any large way the common man at the bench and the machine has had a real chance to use his hidden and much overlooked inventive genius and organizing ability.

In every shipyard, foundry, machine shop, electrical shop, and airplane factory, the common man at the bench has contributed gloriously to the speed and quality of our production. Management asked for the help of the worker and through his co-operative efforts, time and time again, tools have been improved, new jigs and fixtures were invented and new handling devices developed to do a better and quicker job.

Through the co-operation of the worker more effective safety rules and better safety devices were installed to cut down injury and deaths in our manufacturing industry.

Entirely new methods of building ships, airplanes, and other war equipment were developed by our engineering staffs. But the thousands of little tricks and improvements to cut time further and improve production came from the brain of the worker. This integration and co-operation between management and the worker on the production problem is perhaps the outstanding contribution in our war effort. It was conceived and developed in a spirit to win the war and establish peace. Teamwork never before reached so high a goal in manufacturing.

For the first time in industrial history we have seen the *uncommon qualities* of the common man integrated with the genius of the trained engineer to produce our enormous quantity of war goods in the shortest possible time. This co-operative effort in improving the methods of production is so staggering that to let it pass unnoticed in the history of the war would be a great loss to industrial management. To evaluate these uncommon qualities of the common man in terms of college credits would show him up rather badly against this measure of education. On the whole, criticism concerning the education of army and navy inductees may be pretty well founded. The average worker cannot boast too loudly about his grasp of the traditional reading, writing, and arithmetic either. But, thank God, during the past fifteen years he has had an opportunity to develop his inherent birthright as a tool-using being in the industrial-arts and vocational shops of our public schools. And this shop training together with the special training given to thousands of men and women in these same school shops has contributed immensely to the ability to use and understand the new tools and mechanisms which the worker had not only to use in the work of making war equipment and supplies, but also in handling the machines of war against the common enemy.

Home Study Courses

Another factor in the vocational education of the common man is the study which he has been carrying on in his spare hours at home for many years. The private home-study school is distinctly and uniquely American in its origin and heritage. It had its roots in the philosophy of practical idealism which has permeated our history, growing out of the very human needs on the part of many individuals for some means to acquire training which would enable them to advance in their jobs or chosen professions. The definite desire on the part of many to study for self-improvement led farsighted individuals to institute the private home study school.

Its growth has been phenomenal. The fact that a few years ago more students enrolled in private home-study courses than in all the resident colleges, universities, and professional schools combined, attests to this growth. It is typically American in that it is a practical solution to a real situation which heretofore has been unsolved by the professional educational fraternity. More than a million workers can testify to the fact that the related technical knowledge which they received through home study has enabled them to work more intelligently and skillfully and was the means by which they increased their job responsibility and pay.

A study covering the first ten thousand students enrolled in the year 1943 by a well-known Chicago school, showed that over 50 per cent of the entire enrollment were engaged in total war work. Twenty per cent of the ten thousand students were engaged in partial war work, 29.7 per cent in civilian work. To say that those who were in civilian work were engaged solely in civilian occupations is neither fair to the students nor entirely true to the facts. Over two thirds of them are employed by companies which contribute materially to the war effort, but at the same time continuing the process of their production for civilians. These students were at work for such firms as International Register, Armour & Company, Philco Radio, Railway Express, Western Union, Otis Elevator Company, American Optical Company, Proctor and Gamble, Libby & Company, American Can, Standard Brands, and scores of other firms, large and small.

Another large school in Chicago enrolled over four thousand men in machine-shop practice covering the important machine tools and the crafts of patternmaking, foundry, and welding. All of these men were at work in war industries. A large number of these students were working at least 48 hours a week and yet found time to study so that they could advance more rapidly on the job.

A study of the student body of home-study schools which have a membership in the National Home Study Council shows that thousands of supervisors and expert workers in industry received their entire technical education by the home-study method. Thousands of these men holding important supervising jobs have all the aptitudes and mental ability for carrying on a college education, and though they were denied this privilege of attending a resident college, it should be remembered that they brought this superior quality not only to their studies but to their work. This group of workers who looked to home study for the furtherance of their education are from the point of view of numbers the most important adult student body in the world. They comprise all those who are determined to pursue organized study despite a multitude of interfering adverse circumstances which make it impractical or impossible for them to attend resident classes. They are for the most part the men and women who have found their lifework and need further education in order to progress in it.

The private and home-study schools have rendered these students and our American industry a great service in supplying the needed technical education to enrich and supplement the work experiences of the shop. To this group we also take off our hats for their great contribution in winning the war. Taking a cue from Mr. Winston Churchill's immortal statement we can say, "Never have so *many* contributed so *much* to the winning of a war."

While noting the enormous gains in technology during the war period, it is important to note that the same cannot be said of our co-operative efforts in the field of industrial relations. The industrial peace has been maintained but not without a good deal of warlike growling. Truces of various kinds have been maintained during the war but many of these truces were of the armed variety. Promises not to strike were made and were broken. The most discouraging fact about these quarrels and strikes is that a very large number were the results of petty differences between workers, as well as between management and worker. And often a petty, childish stubbornness appeared on both sides of the fence when the

*American School, Chicago, Ill.

parties at fault were brought together in an effort to settle their disputes in a friendly manner. We are not impressed by the sagacity of either labor or management in dealing with difficulties of this kind. We are not impressed by any superior quality of management in dealing with a problem of strikes or work relations, though we might have expected superior wisdom due to the superior schooling of this group.

Pseudo Experts

While becoming specialized in our various fields of technology we seem to have developed a large number of what Dr. Hutchins of the University of Chicago calls "uneducated experts." Both labor and management are suffering from the handicap of the uneducated expert. Experts in technology, experts in production scheduling, experts in plant warfare, experts in coercing people, experts in "kidding" people, experts in legal camouflage, experts in the emphatic *no* of the domineering *big shot*, and all woefully ignorant and uneducated in the skills, knowledge, and understanding about dealing more humanly with their fellow men. Here again, labor and management need to realize that the job will not be done expertly unless they get together in a more human way.

We have to learn that industrial relations are *human* relations at work in industry. Throughout the country we can see some evidences of a better integration in the matter of industrial relations. And in general it is where the size of the business still makes it possible for management to keep in close touch with the worker. As the business grows in size the difficulty of maintaining good industrial relations seems to increase. The *big stick* of power seems still to be the force that shapes the ends of the worker and a large balance of power in the hands of either labor or management can only spell industrial war. To bring industrial peace, management and labor must be willing to travel along a highway of integration, starting in the middle of the road, ready to give as well as to take, ready to trust each other for the common good of all. Traveling along a highway of this kind will develop faith and understanding and out of understanding will come wisdom in handling the difficult problems of good work relations. Traveling together is the only way to develop the essential *we* relationships which is the heart of good work relations. It will take time to discover the common ideals and purposes and develop the means for implementing these. When understanding is developed by practical action rather than by academic knowledge or imposed creeds, the hope for quality of unity and relationship (the priceless ingredient of teamwork) runs high.

Both management and labor are interested in the economy of makers and buyers, and in a successful economy both must have the will and the money to buy. In meeting the unquenchable desire for goods and services it becomes a matter of first importance to both management and labor that they produce the best possible goods in the largest quantities at prices which will find a ready market. Much further thinking is needed by both labor and management on the question of wages. Wages are a relative thing. What counts in the final analysis is not what is in the pay envelope but what the "take home" money will buy in terms of food, shelter, clothing, health, and recreation for the worker and his family.

What is on the worker's mind and what he wants is being continually brought to our attention through recent surveys and reports. A steady job is still No. 1 on his list of wants. Next is freedom in chosing his job. He has shown a liking for job evaluation systems in wage determination. He has a leaning toward employee merit ratios. He thinks on the whole that his company is capably managed, that he is being fairly treated, and that his employer has his interests at heart. He believes the union is his real friend because he feels that in the strength of the union lies the hope of his job security. He is not adamant for the closed shop or the maintenance of membership idea. He is becoming interested in guaranteed yearly wages. He will fight wage reduction. He wants his take-home wage to be nearly the same as his wartime wage, plus the extra he got for overtime. He recognizes, however, that concessions will have to be made covering these demands. The worker wants to live a fuller life in terms of the conveniences and possessions that lift his self-respect and mode of living. And he is willing to take a chance in growing in spirit if these things come first. Both labor and management still require further enlightenment about the kingdom of God and His righteousness coming first.

Working for the Peace at Home

The best brains in the world today are sitting around international tables thoughtfully pondering about universal peace. The first step in breaking down international peace comes from industrial war in our own back yard. The first stages of industrial war and conflict in any country are conceived in the pains and anguish of hunger and the fear of unemployment, with their attending conflicts between those who have and those who have not. And these black specters of industrial war can only be blotted out when management and labor sit around a conference table—not on opposite sides of the table in a spirit of distrust and suspicion—but side by side in an honest effort to work out a solution which will bring a fair return to capital and at the same time give a decent living to labor.

One of the most hopeful things that has happened to management and labor relations this year is a charter for labor relations developed under the joint auspices of the Chamber of Commerce of the United States, the Congress of Industrial Organizations, and the American Federation of Labor. The charter is not a large document, but it does cover some significant points. Labor recognized the inherent right of management to manage. Management recognizes the inherent right of labor to organize and to engage in collective bargaining. Both agree in the principle of the right of private property and freedom in choice of action. Both unite on the fundamental principle that a system of capitalistic private enterprise is a good foundation for the peaceful and prosperous expanding of American economy. Last but not least, the code includes a rather emphatic declaration that excessive government interference in the field of labor and management is not necessary to industrial peace. The founders of this charter are President Eric Johnston of the Chamber of Commerce, President Philip Murray of the CIO, and President William Green of the AFL.

Like the International Charter of San Francisco this is the beginning, a meeting of minds, a start on that highway of integration. And again the start is in the middle of the road and so long as it stays there we have great hopes for development of industrial peace. On this point of government interference in the dealings of management and labor, it is perhaps well to observe that we need some agency powerful enough to interfere when the welfare of the average citizen is being jeopardized to the point that he has to suffer because labor and management cannot get together in solving their differences.

Twenty-five years ago labor needed the collective power of the strike to match management control of wages, hours of work, and work conditions. But surely we must look forward to a more intelligent and more effective way for dealing with work relation problems. We are accepting labor's right to collective bargaining. We have made much progress in arbitrating labor difficulties. Can we not hope for the day when the strikes and the walkouts will be remembered as belonging to the dark ages of industrial revolution? The war has proved that management and labor can get together on the problems of technology. They have set up a magnificent record of work well done through the integration of their brains and skills. Is it too much to hope that this same integration can be carried out in the field of industrial relations? It may seem a long way off when we look through the wrong end of the telescope but only an arm's length if we face the problem squarely and act together as men and not like the fools which the poet sometimes labels us. The highway to industrial peace lies in management recognizing the uncommon qualities of the common man and integrating them with the experience and skills of management.

Give me the money that has been spent in war and I will clothe every man, woman, and child in an attire of which kings and queens will be proud. I will build a schoolhouse in every valley over the whole earth. I will crown every hillside with a place of worship consecrated to the gospel of peace.

—*Charles Sumner.*

Drowning was responsible for over one fourth of the 14,500 public accidents in 1944. — *Safety News.*

Industrial Arts and Vocational Education

John J. Metz, Editor

WHAT ARE WE DOING WITH OUR POSTWAR PLANS?

Not so very long ago there was considerable discussion about what the school shop would be like after the war. Now happily, World War II is a thing of the past, although our government will have many a headache, both in Europe and in Japan, before finis is written at the end of that terrible catastrophe.

But what about the postwar plans that had been made for the shops in which industrial arts and vocational education are being taught? Is something being done to make some of the proposed postwar plans come true, or are we gradually allowing the troubles of the day to overwhelm us so that little or no progress toward a better and more advanced way of teaching our shop courses is being made.

It is true, numerous difficulties must be overcome before many of our old procedures can be altered. We must still, in most cases at least, be satisfied to work with our old, and in some cases, woefully inadequate equipment, because the new is not yet available. Then, too, much of the wished for material with which we would have our students work is still hard to get — so what can we do?

Many things can be done, in spite of the fact that we are not yet ready to put into action all of the things we dreamed about when we so glibly talked about our postwar efforts. Have we really more than a mere sketch of what we intend to do when new equipment is obtainable and when materials are more freely procurable? Is it not true that most of our planning was rather nebulous and designed for something in the future and not for something that is here and now?

Supposing, then, that we are still handicapped, what about the time, say a month or two hence, when we may really get what we had planned to get. Supposing that we have really obtained the equipment and material for which we have been yearning for the past few years. What then — are we ready to go ahead, or are we only prepared to see what we can do with the new acquisitions after they have arrived.

What will the new things mean in the sum total of our teaching endeavors? Will our courses be any better? Have we a clear blueprint of what it will mean, not only to us as teachers, but to the students for whom our plans must be laid if they are to have any value at all?

Have our plans affected the subject matter which we are teaching or the manner in which we are presenting it? Has it affected the physical setup of our classroom, whether that be a shop or a drafting room? Has it prompted us to see that our offerings to the students are more closely correlated with the subjects they are studying under other teachers? Has our work been planned to give the student a realistic concept of his future life activities? Have we helped the student to fit himself better for getting along with the members of his family, his neighbors, his classmates? Have we helped him to acquire a worth-while hobby? Have we developed in him a generous, co-operative spirit?

If our answer is in the negative to an appreciable number of the foregoing questions, our plans for the present afterwar period have not been of the best, and we had better get to work on them so that they will be ready to function as soon as times have become more settled.

WILL YOUR SCHOOL SHOP PARTICIPATE?

There is a real opportunity for the members of the American Junior Red Cross to help in international rehabilitation work. The first project undertaken by the American Junior Red Cross working co-operatively with the American Red Cross and the U. S. Office of Education is to pack and ship about ten million special educational gift boxes to the children of the liberated countries in Europe. The articles consist of educational supplies which the Junior Red Cross members are to collect, buy, or make.

Shop instructors, who are interested, should get in touch with the Red Cross, get their assignment, and launch out on this worthy undertaking.

SCIENCE PLAYS A GREATER PART

The war has greatly augmented the uses made of science in the solution of problems about which the average man knows little or nothing.

It was but a few months ago when we learned about the advances that had been made in the study of the sun's atmosphere from the closely guarded solar observatory perched high in the Colorado Rockies. The motion pictures made there by the physicists gave a running account of how the sun's corona affected the earth's atmosphere, and helped our military leaders plan attacks on the enemy when they knew that the electrical disturbances in the air were playing havoc with the enemy's radio communication.

Items like these picture the value of a knowledge of science to the layman, even though he does not fully realize how a piece of scientific information, specially obtained for a military use, can be of much importance to him as a civilian. However, it does mean a great deal to all of us, even in peacetime, because an outcome of this study already shows that it may have much value to us in the spectroscopic analysis of steel. Besides this, it may help us in the fields of radio, weather forecasting, and in making air travel safer.

Of course, this is but an isolated item in which science has advanced the things which we knew before the war. Many similar instances might be recited about scientific advances that were made in other fields because there was a definite need, and educated men put their minds to work seeking for a solution.

The world needs more men trained for just such work, and our universities and colleges are doing commendable work in preparing those who can assist and eventually succeed the students, researchers, inventors, and analysists, who have made such outstanding scientific advances possible.

The average boy and girl who will not take up higher studies but who will have to live and work with and handle the scientific gadgets which are made possible by studies like that described can derive a great deal of benefit from their junior and senior high school science classes. It depends, of course, upon the vision which the instructors have of their opportunities. It is a real challenge and one that deserves earnest study and real effort.

Youth must be prepared for their future lives in this world of scientific wonders. To prepare them for it, all who have anything to do with their education must conscientiously and consciously unite and correlate their efforts so that their students can get the most out of the proud heritage which our country bequeathes to all those who make themselves worthy of being Americans.

Teacher Qualifications in Vocational Trade Shops

*Ernst H. Suerken**

"The ability to deal with people is as purchasable as sugar or coffee . . . and I will pay more for that ability than for any other work under the sun."—*John D. Rockefeller, Sr.*

This comment made by a man who ought to know, if we judge by his success in dealing with other people, is equally as applicable to vocational instruction in trade shops. Many more vocational instructors are needed and those who enter the field are constantly being faced by increasing responsibilities.

There are only three kinds of work in the world—working with *things*, working with *words*, handling *men;* and the last of these is the most important in any man's life. To meet, win, and handle people, four essential qualities are needed:

1. *A Mature and Balanced Personality*

One of the most important requirements of a vocational-shop instructor is a suitable personality. The instructor deals in human relations. He is a leader of students in a work and community environment. Personality characteristics determine whether or not the instructor can direct his students, co-ordinate the activity of his shop, and obtain the co-operation of his colleagues.

There is a close relationship between the effectiveness of a teacher's personality and the degree to which students imitate their instructor's work habits and actions. The teacher's work attitude, decisiveness of action, and evenness of disposition weigh heavily in determining morale and atmosphere in a shop. The personality of the vocational-shop instructor might be defined as the ability to get along with his students and supervisors. The vocational-shop instructor should possess a mature and well-balanced personality.

The successful instructor explains why his method is best and thus creates a good relationship with his students that enables them to help him without being placed in the category of "teacher's pet."

The unsuccessful instructor displays an undesirable personality. He seems self-centered. He overlooks the feelings of his students. He uses fear as a method of directing his students with the result that their attitude toward him is unfavorable.

2. *More Than Trade Skill Is Required to Become an Instructor*

In the past, vocational-shop instructors have reached their positions by going from the trade into teaching. Their ability to work on a job and succeed in it has been one qualification. It does not always follow that they will be good teachers because they have been satisfactory production workers.

Many individuals require a long time to make a transition in thinking from being a worker to becoming an instructor or teacher. They have usually mastered their jobs by good co-ordination of bodily movements and expert skill in working with tools and machinery. Machines and tools don't talk back nor have they feelings. It was not necessary for these men to develop any special personality characteristics or understanding of people essential for good leadership.

In other words, mere trade skill or craftsmanship is not enough for success in a vocational-shop instructor. In addition to trade skill, one must have the ability to plan work and obtain results, train students in specific job duties, be able to handle unusual or unexpected problems, be interested in personal development and problems of organization. Lacking these, an individual is merely interested in production, in making things, rather than in working with students.

3. *Good Teachers Have Favorable Attitudes*

When a man becomes a vocational instructor he must visualize his work on a larger mental horizon. As a mechanic, his responsibility was limited. As a teacher it is necessary for him to visualize all the operations for which he is responsible in his shop. It is also very important that he adjust himself to human relationships and problems. It becomes necessary to shift his thinking from being led and directed to being the leader and giving assistance. He must now give instructions and give orders. All of this brings into play personality factors that may or may not have been acquired but which are all essential for leadership.

Thus we see it is essential for men who assume supervisory responsibilities to possess or develop a positive and favorable attitude in a variety of situations. Instructors must have a suitable personality combined with favorable attitudes toward their work, school, personal life, country, and local community.

4. *New Instructors Must Possess Essential Qualities*

If we approach or analyze successful vocational-shop instructors from still another angle, we find that the following broad qualifications have been essential to their success:

A. *Initiative, Resourcefulness, and Self-Reliance*

Men who accept supervising responsibility are in positions where they must make their own decisions. They must meet the challenges afforded by the opportunities for persuading and convincing others.

B. *Social Contacts*

The successful vocational-shop instructor is one who enjoys meeting individuals and assumes some leadership. Such a person is more likely to be an officer in a social organization or club. He possesses self-confidence, aggressiveness in dealing with people in combination with essential tact.

C. *A Wholesome Attitude Toward Self and a General Outlook of Confidence in One's Own Abilities*

A distinguishing characteristic in a successful instructor is an attitude of optimism toward the future. There is less inclination to be worried because he has confidence in his own ability and his ability to face the future. Such an individual has a generally forward-looking, hopeful, or cheerful attitude.

D. *Moderate General Capacity in a Variety of Situations*

The successful vocational-shop instructor has a moderate degree of knowledge, information, and general capacity for understanding a variety of ordinary situations in work and in contact with people and students. The best indication of this moderate, but all-round capacity is shown by the ability to answer general, practical, and technical questions. There is a common core of varied knowledge and understanding which the successful vocational shop instructor must possess.

We must realize that one's vocation represents a central purpose in life, and that efficiency in the vocation is the rightful heritage of everyone. I believe that if we accept such a philosophy or pattern, vocational education can and will be a significant influence in the building and reshaping of an America unlimited.—*R. H. Woods.*

In the year before World War II, world trade in steel plant products totaled nearly 16,600,000 tons of pig iron and rolled steel. America exported only 1,400,000 tons, while Germany exported 4,000,000 tons; Belgium-Luxembourg, 3,300,000 tons; the United Kingdom, 2,300,000 tons; and France, 1,700,000 tons.—*Steel Facts.*

Enough time was lost from farm accidents last year to have produced five bushels of wheat for each of the 137,000,000 persons in the United States.—*Safety News.*

*Supervising Principal, The Children's Village High School, Dobbs Ferry, N. Y.

Industry and the Part-Time Co-operative Program

*Sgt. Snyder B. Keathley**

In Tennessee the part-time co-operative trade and industrial training program in diversified occupations had a steadily increasing growth up to the entry of our country into the recent world conflict. With our country on a war mobilized basis the requests for new programs increased in volume, but due to the shortage of qualified co-ordinators, only a few programs were installed after 1941. The enrollments in the old programs hold their strength and the over-all picture of part-time trade training remains very healthy.

In an effort to accumulate information which would explain the appeal of a program so popular both in depression and boom time, the writer, in addition to accounting the fundamental bases of the program, contacted industry of national scope and industry on the local level. This article gives a cross section of the correspondence which came to the writer from *big business*. He feels that the thinking shown is a partial index to why a part-time trade training program is assuming, and should continue to assume, in increasing volume, such an important place in vocational education on the secondary school level.

William S. Knudsen, while president of General Motors Corporation, in the June, 1939, issue of the *American Magazine*, in an article entitled "If I Were 21," made the statement that a person educated entirely through books is only half educated. He stated further that there is a kind of practical knowledge and good sense which can flow into the brain only through the use of the hands.

The diversified occupations program takes full advantage of the fundamentals stated by Mr. Knudsen. A student who is graduated from high school and has included diversified occupations in his schedule of classes presents for his diploma 12 credits in academic subjects and 4 in trade training. The academic work is necessary for giving the student the proper perspective and usable information especially relative to English grammar and literature, basic mathematics, basic science, his historical heritage, and government and citizenship. It is imperative that every American youth be well grounded in these fundamentals. The diversified occupations trade and industrial training program prepares the student to enter the occupation of his choice and to be happy in his work while he earns sufficiently to give his family the benefits of the American way of living.

A student participating in the diversified occupations program attends school half-day and works in industry half-day. He is employed for the purpose of being trained by his employer. His training program is carefully worked out by the employer and the co-ordinator, who represents the school. He works in a controlled preapprenticeship situation and learns as much of the trade as is possible in the time allotted. He is paid a wage comparable to that of beginners in the trade.

The half-day at school is spent in two regular academic classes and a third class in which he studies information related to the trade or occupation he is learning. Since there are several student learners in the related class at one time and many occupations represented, the work is on an individual basis. The co-ordinator supervises the study and makes every effort to correlate the related information being studied with that phase of the trade or occupation which the student is learning on the job at that time.

Going back to Mr. Knudsen's statement, these boys and girls are definitely taking advantage of education. By working on the job they are acquiring that practical knowledge and good sense which flows into the brain only through the use of the hands. At the same time, through the academic subjects they are acquiring that background so helpful in good living, and by means of the related study they are getting an insight to phases of their trade or occupation which they would not otherwise find.

What does industry think about this type of training? There is no better way to pass the information along than by quoting directly from letters on the subject written by men who are in position to know. Holman Scott, Industrial Relations, Socony-Vacuum Oil Company, states, "In our preemployment discussions with not only high school graduates, but college graduates as well, we are keenly interested in the regular or odd jobs the individual may have had during his high school or college course. We feel that an individual who, either by force of circumstances or on his own initiative, produces a certain amount of income during his school days gains a sense of responsibility that cannot be acquired otherwise."

Here we have industry giving preference to the youth who has worked on a job as well as studied books. Note that Mr. Scott mentions that sense of responsibility which he, and others like him, want to find in the high school graduate. On the basis of his statement we can say that the diversified occupations program "rates" in the industry of which he is a part.

Going into the field of communications, Earnest de la Ossa, Personnel Director, National Broadcasting Company, Inc., in his discussion of the diversified occupations program states, "One of the complaints that business has had for many years is that 'new people are such risks, you can never be sure that they'll work out,' or 'When people get out of school today they've learned a lot of theory but let them try to apply those theories to good practical work and they are at a loss.' The co-operative system answers both of these criticisms and answers them well. Your high school training has taken you outside of your books and has served as an orientation period. It has enabled you to work and learn outside as well as inside the classroom. Because of the size, the pace, and the complexity of business and industry today, the first job is the big hurdle. Surveys have been made and indicate that the percentages of failures on the first job oftentime impose a handicap which is difficult to make up. It may destroy your confidence and it may place a none-too-positive mark on your work record. The first jobs are not the demons that they may seem."

The diversified occupations program can get a young man or woman over the hump of that first job. The student-learner knows that the school is behind him and that the employer is sympathetic. He knows that the co-ordinator will be on hand to advise in tough situations.

Along this line of thought, the first interview in applying for a job is a big obstacle. The writer knows an honor graduate of one of our foremost universities who, after graduating near the top of his class, applied in person for a position in an engineering firm. The personnel director's first remark to my friend was "Sit down, son, before you fall down and break something." The diversified occupations student-learner has had training and practice enough in the interview technique, as a part of his high school training, that he usually has little or no trouble with his interviews.

Continuing, Mr. de la Ossa makes a statement which, in light of events of the past 39 months, carries weighty impact in favor of the co-operative system. It follows: "It seems logical to me to believe that just as would be the case in entering the field of business or industry, so will the diversified occupations boy have an advantage on entering the armed forces. This advantage should carry through until he is mustered out and all things being equal, it is my feeling that the army or the navy will have better material on which to build and that they, therefore, in classifying such vocationally experienced graduates will use them in work which is further specialized; whereas, the usual high school graduate will be assigned to those nonspecialist classifications which do not train him nearly so well for a peacetime contribution."

*Education Branch, Convalescent Services Division, Hq. AAF Personnel Distribution Command, Louisville, Ky.

We consider this attitude convincing evidence that the diversified occupations program can occupy a vital place in our educational system and that it has and is aiding in the meeting of our greatest emergency.

Looking to the retailing industry for a statement about part-time training, James C. Worthy, Personnel Department, Sears, Roebuck and Company, asks the question, "What are the chances of a high school student's success in industry if he works during his high school course?" He then answers his own question as follows: "I believe his chances are better, other things being equal, than the student who has not worked. He should have an advantage over the nonworking student because he is able while working to gain valuable business background. Also, he will learn how to conduct himself in a businesslike way and gain knowledge as to what is expected of him in business."

Industry is looking for those boys and girls who can make a quick adjustment. The time saved by that quick adjustment is money saved to industry and money earned by the graduate. The diversified occupations graduate has made the necessary adjustments before he begins full-time employment. He is well ahead of the game.

R. C. Wise, Staff Supervisor, Industrial Relations, Westinghouse Electric and Manufacturing Company, Sharon plant, pays the diversified occupations program a high compliment when he says that such an arrangement (part-time training) enables the students to grasp more from their studies than they might otherwise. He continues: "It is obvious that working and going to school requires more diligence than just going to school or just working, and that definite personal benefits are realized. A boy learns two years earlier in life that it requires extra effort to obtain more than the average from life. He soon learns or is taught how to systematize his time and effort because he has to study and work. He learns the real meaning of responsibility.

"It might also be pointed out that the co-operative student has access to employment immediately upon graduation because he is already employed. He will receive and can demand a higher wage than the high school graduate without this training because of his higher skill and experience.

"I feel safe in saying that probably 95 per cent of the foremen in industry are selected because of their skill, experience, and ability to work with the 'man in the shop' and these boys will have a two-year jump on boys without such training. It is common knowledge that many of industry's supervisors and managers are former apprentices and foremen."

Mr. Wise sums up many of the virtues of the diversified occupations program and in so doing points out why industry is so favorably impressed with part-time training.

Any boy or girl who is a high school junior or senior, and at least 16 years of age, should carefully consider the values to be derived from a co-operative program because industry is going to provide the jobs for these boys and girls, and industry likes the part-time, co-operative trade and industrial training program in diversified occupations.

You and the Ex-Serviceman

*John E. Crawford**

The following article is taken from a booklet especially written for foremen who will be confronted with the job of fitting ex-servicemen back into industry. The booklet contains so much that might be helpful to supervisors and teachers who will have these same ex-servicemen in their classes, that permission was obtained from the John A. Roebling's Sons Co., Trenton, N. J., to reprint it for our readers.

Back to living again . . . in the most beautiful country in the world . . . back to a land where freedom rings and a man has a fair chance to get something good out of life.

Maybe the serviceman is coming back to his family or back to the girl that waited for him. Perhaps he will want a whirl of parties and dances. Then again, he may just want to mosey along shady streets where happy children play. Old friends, a comfortable bed, shoes that fit, plenty of his favorite home cooking—these may be what he will seek when he first gets back to the home town.

You may not think the ex-soldier has changed much, when you see him back in civilian clothes again, but that's where you're wrong. He *has* changed. Changed in ways that make him older than he seems, and cynical at times about things in general. A man can't live through what our fighting men have been through and still be the same as he was.

How *much* has he changed—that is the question. What does he intend to do, now that he is back to "humdrum" routine again, as he sees it? Will he soon adjust to the old job? Will he *want* his old job, or has he brought back new skills and a *new point of view* that make the *old* job seem too dull or too low brow?

Questions like these about the returning serviceman are puzzling many people these days. Friends and families of some veterans relate how glad their servicemen seem to be home again—and in the same breath they add how strangely *dissatisfied* the men seem to be. You hear about men coming back to the jobs which their letters said they wanted so much, and yet how they quit and change to other jobs in a few short weeks. Now this means valuable time and energy lost for industry, and it means less and less satisfaction for the ex-soldier when he should be getting his feet planted on solid ground again as soon as he can.

It is mainly the foreman who must know how to handle correctly the problem of the ex-serviceman coming back to our shops.

How well the ex-serviceman readjusts to the job again largely depends on how the foreman does certain things: how he manages the first interview, how he shows him around, how he instructs him about his job, and how he helps him get back to a steady work week.

These things are easy if one knows how. . . . If the foreman is absolutely certain that he knows the answers, then what this article has to say about these problems does not have much value to him. But if he is like the vast majority of people these days, when it comes to knowing just what to do about the problems of veterans as they return to industry, and *how* to do it—then the rest of this material has a special meaning for him.

It should be studied carefully because no article of this size could possibly cover all that foremen need to know to deal most effectively with these problems. Condensed here, however, are the most important things that should be known and used in helping the ex-serviceman coming back to us to get his stride quickly.

Time Changes Things

First of all, we must realize that it will take time for men fresh from the chaos of modern mechanized warfare to get down to plain simple living like the rest of us have been used to back home. That is why the law put an allowance of ninety days between the date of a veteran's official separation from the armed services and the day he goes to the employment office to talk about a job in industry. In some cases, perhaps even more time might be needed for the veteran to come to the point where he knows what he really wants to do and is ready to settle down and get at the job.

That time between leaving the separation center and going to the employment office will provide much needed leeway. He can blow off long pent-up energies and spend a few dollars doing things his heart and mind have been yearning for so long. To deprive the ex-serviceman of this period of readjustment would not only be unwise but foolish. We will profit greatly all around by using time as a healing agent to calm tense nerves and diminish jittery feelings. It takes time for a man to get over the things that months of fighting did to him on fiery shores that seemed a million miles away from those he loved. The miracle is

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that anyone ever comes out of war sane, hopeful, and ambitious to take up living again where he left off, yet time can work such miracles.

As the days roll into weeks, the ex-serviceman begins to think again about that new home he had planned before he went away . . . or things like a new stove and new furniture. Maybe he isn't that far along, maybe he just wonders how much a good diamond ring will cost for the girl who waited for him. Whatever his plans, he finally comes to figuring in cold hard dollars . . . dollars that must be earned somehow, somewhere.

Then, and not until then, will he begin to think seriously of finding a job. He may even get out the little booklet the separation center gave him the day he was discharged, to see what the "G. I. Bill of Rights or something" has to say about his chances of getting a job and how to go about it.

What the Law Says

In brief, the Selective Service Act says that the ex-serviceman is entitled to reinstatement in his old job

. . . If he has been honorably discharged;
. . . If he applies for that job within 90 days after separation from the service;
. . . If he is physically and mentally able to do that particular job; and
. . . If the employer's circumstances have not changed so that it is now unreasonable or impossible to reinstate him.

The law further states that if he *is* reinstated, his job must be reasonably sure for a year, and his time in the services shall be considered as a furlough from the job.

These are all good provisions, and the ex-serviceman deserves every one of them. But if industry simply felt that way about it, that we "owe" these men something, it would be better to keep on owing the debt and never pay it. The ex-soldier wants no grudging concessions. He needs some things that mere law can never provide. He will get them, too. . . .

Even before the law was down on paper, more than 2000 communities had organized carefully laid plans on postwar rehabilitation, retraining, and reintegration to industry. These plans all exceeded the bare legal minimums. Take, for instance, the plan worked out for the John A. Roebling's Sons Company, Trenton, N. J.

The Company Viewpoint and Policy

Management at Roebling has gone far beyond the meager provisions of the law, in thinking and planning on the general policy for re-employment of veterans.

1. The Company is considering each man individually. When necessary, unusual circumstances may be evaluated in the light of his special needs.

2. Roebling wants the veteran who is rehired to get a job for which he is well suited, as far as possible. Perhaps some physical incapacity puts the old job out of the picture. Maybe the man has picked up new skills. Some other job might be better for him. Such changes are being made wherever practicable.

3. Foremen are helping the ex-serviceman relearn his job and readjust quickly to shop routine. Many foremen have been trained in effective methods of job instruction, and can see to it that the man gets expert on-the-job training.

4. Personal counseling services are available. The ex-serviceman can bring his personal problems to competent sources of advice and help. Special staff services are available any time he needs them. He should feel free to ask advice of the medical, training, and employment department, through his foreman.

5. Opportunities for self-improvement and advancement are available. Many avenues are open to the ex-serviceman in Roebling to improve his skills and abilities if he desires. Vocational and educational guidance are available to him as much as to any other employee.

All this is as it should be, of course. You can see now why the foreman is probably Number One Man in the plant, as far as getting the veteran back on the right job is concerned.

We want the veteran to look at the foreman as his leader and guide when he rejoins us. How the foreman directs him, instructs him, corrects him, understands him, and advises him will make all the difference between the veteran's disgust and failure or enthusiasm and success on the job.

The following suggestions condense the best thinking these days on methods of directing men so that they put forth their best efforts. These principles should be applied to supervising all employees everywhere, but they are especially applicable to supervising ex-servicemen.

Suggestions for the Foreman

Think about what has been said in the foregoing. Practice up on your best supervisory technique. Learn to do an outstanding job of helping the veteran "make the grade" here at home again. It's a big job. It's one of the most important tasks men face anywhere in industry.

That First Few Minutes

The way you look the veteran over in his first few minutes with you, what you say, and especially *how* you say it, may be as impressive as anything else that transpires in his coming months under your direction.

Someone from the Employment Office will usually bring the veteran to your section and introduce him to you in a friendly manner . . . perhaps something like this:

"Hello, Mr. ———. Remember I called you about Pvt. ——— of the U. S. Army. He has decided to come back to Roebling and I'm glad to bring him here to meet you. . . .

"Mr. ———, I want you to know Mr. ———. He made a lot of people proud of him in that ——— action (name the place or action), and he's planning on doing another fine job here with us."

Put some personality into your handshake. Lay aside whatever you may have been doing. Smile and look him in the face as you talk. Perhaps you will get a chance to make a leading comment or two:

"Hello, ———."

Get his name right. Everyone likes to hear his name pronounced correctly.

"Are you anxious to be back at the job again?"

"What technical training did you receive in the armed forces?"

This will be easier to do than you may think. You will have had a special "preview" of the ex-serviceman, by way of a personal conversation with our employment office. You will have been given the important facts about:

His age and schooling
Where he worked before and what he did there
His armed force service record
Special abilities he can apply to the job here
Any physical problem he faces in re-employment
Any personal problem that may affect his job attitude
The job to which he should probably be assigned

Having these things in mind will make it easier to meet him.

The Friendly Interview

Take the man to your office where you can chat with him a few minutes leisurely about *his* plans . . . how *he* feels about coming back to work and so on.

You may have an opportunity to tell him something about what the company has been doing in the war effort. This would imply how much *he* is needed on the home front. He may ask questions about "how things have changed"—what has happened since he left. *Let him express his ideas.* Draw him out a bit without going overboard into touchy issues.

Be a good listener. Take mental notes to help you guide and supervise him better. This friendly interview provides a grand chance to discover his *real* feelings about the "new" old job. If he has the inclination, let him talk about his personal plans and the ambitions he has. A man's hopes and aspirations affect the way he will look at his job, and you should know about them. Show him that *you* are interested in him *as an individual.*

He may be ambitious to advance to a better job some day. That's good. Tell him how other men *have* advanced, and how he can do it some day *when he is capable of bigger responsibility and knows more about his own job and the jobs related to it.*

Talk about the job. Tell him who will be his superior. Tell him who he is to report to in the absence of his immediate superior. These things are important. Every employee wants to understand lines of authority in his company.

Talk plainly about his rate of pay. Be sure he knows how he will be paid, and how his pay is figured.

Avoid morbid curiosity about the veteran's "condition." He may *seem* willing to discuss such things as the long days he spent in the hospital center—but that's probably because he is polite or does not know how to escape prying questions. Such inquisitions really rip him wide open and he will not like that.

Take him around your section. Let him see the place, let him get the layout. Introduce him to other employees, with such a remark as:

"Sam ——— is coming back to us in a day or so, and he will be working on ——— with you. He used to help to boost production at Roebling, and he is going to help us do it again. . . ."

Make these comments *sincerely*. In short, remember that *we all like to be treated as individuals all the time.*

Be friendly. . . .

Be sincere. . . .

Be sympathetic without being sentimental. . . .

Don't gush . . . and never use flattery.

You'll get along all right if you keep these things in mind in your first interview with the veteran and as you take him around your section in the plant.

The Big Question

What will this ex-serviceman be like who comes back to our plants? The answer to this question will determine to a large dergee the methods we must use to make sure that "square pegs do get into square holes," without knocking off all the corners first. The right man in the right job can only come about when we know a great deal about each man and each job.

Charles R. Byson, our president, has sent personal letters to our employees in the armed forces. In these letters the serviceman was asked to tell us whether he planned to come back to Roebling, what he had been doing since he went away, what new training he had, and other pertinent information. From this personal survey we will have gained much insight into each man long before he appears in the employment office to talk about a job.

After he was rehired, he was then interviewed by one of our top management, so that the veteran comes to you with a sense of sincere welcome back to the job in industry. . . . *Your* personal interest and help will further emphasize that first impression of the company's feelings toward him in his new venture.

Some Ex-Servicemen Will Feel Strange

There's a bright side to the picture. . . .

The men in our armed forces are the cream of humanity. No finer men ever walked in shoe leather, and their officers are top quality.

These soldiers respected their officers for good leadership, clear decisive thinking, courtesy, and genuine fairness. Officer candidates were picked for these qualities of high intelligence and human understanding, then they were given extensive training to make them exceptionally effective in the direction of their fellow soldiers. The foreman who exhibits these leadership qualities will naturally inherit the same respect and co-operation from the veteran.

The ex-serviceman will have the advantage of strict military discipline. He will retain respect for rank, authority, and position. You will not have to contend with an undisciplined employee attempting to wreck your lines of authority. He will know how to obey orders and to carry them out to the letter, once he is given an assignment *and told how to do it.*

He will bring back many skills which may be useful in his new job here. Once he really gets back on the job he will probably want to make up for lost time. These are good things.

But there's a dark side, too. . . .

Combat does terrible things to men.

Some men will come back to us with *jittery nerves* that jump at the least provocation. One man said that his moment of deepest humiliation was the time he vomited in front of everyone in pure terror *when there was nothing whatever to fear.* His companions could not understand such a thing.

They did not know that fear can be a horrible thing . . . especially when it has gone deep down inside you and cannot be controlled. Some of the veterans coming back to us will not show many outward signs of such fears, but they may experience them inside just the same. The deep unreasonable fear induced by seeing a man six feet away blown to a bloody mess by a grenade may leave a soldier almost powerless to control his nausea every time he hears a loud noise that reminds him of that grenade bursting. It may take months of peaceful employment and comfortable living to reduce these reactions to reasonable levels.

Some of these ex-servicemen may experience periods of depression that come without apparent cause. One man may be very irritable at times, literally exploding about things that other people would hardly notice.

Another may often daydream to himself. In the deep places of his thoughts he will "hear" bugle calls that will be too faint for you to sense. He will recall taps on a shell-torn beach, or maybe reveille at four a.m. on some blasted hill where men screamed in agony all around him. He may remember at the oddest times how the Courageous Kid in his outfit looked when he told the doctor to "go on and take care of the fellow in the next hole, I'll make it o.k."—the courageous kid with a leg gone and an ugly hole in his side. Even God might not want to remember such things, yet they persist in human minds. How anyone could live through such things and *not* be irritable or gloomy or strangely depressed at times would be hard to imagine.

Everybody back home will seem strange to the ex-serviceman for a while. His family won't quite understand him at times, so don't be too disturbed when *you* can't make sense of what he says or does. Just remember that while you took your accustomed path through peaceful days and routine work, he was traveling treacherous seas and flying exploding skies, or lying in filthy foxholes, fighting his way through unending hells of increasing destruction. He will naturally find your day-by-day activity almost incomprehensible. *Only by degrees* will he come to find any meaning in it at all, especially the old meanings. . . .

Only by degrees—that is the important thing. A great many people fail to realize that the war is *not* over when the fighting stops, that army life does not end when the man is officially discharged. There is a *transition* period in between—and its length depends on how great the total change is between the man's military life and his civilian life.

In this transition period, the ex-serviceman may waste hours tinkering with small personal ideas and possessions. He may spend days toying with idiotic devices and schemes. He may be cantankerous and impatient one day and in deep blue moods the next. He may tire himself out wandering alone at the craziest hours. Then again, he may loaf so blatantly that it would drive almost anybody against him. You can expect these things. . . .

War taught that soldier the language of hell, but he found a different gong back in his home town. War taught him the geography of hell, no wonder the home town looked strange to him when he came back. Some soldiers learned war so well that peace may never completely absorb them again; they will always be different.

Returned soldiers are likely to think of themselves not as ex-soldiers but as *old* soldiers. They will tell you they feel very old, though they may be only 20 or 25. Cynical, peculiarly bitter, hard and harsh at times . . . you can expect that kind of thing.

No, it's not an easy job to understand the veteran when he shows these peculiar patterns of behavior. It will take all the skill and patience you can summon to do a good job of supervising some of these men. You will need to *understand* them, sense their difficulties, and help them get back to peaceful ways again. This is the biggest task industry ever faced. *The veteran has earned understanding and forbearance. It is not owing to him as a favor, in any sense.*

Getting Back to the Job

Men in the armed forces received excellent instruction. They were given the know-how of the new job in the most effective way, so that they have come to expect good instruction on every job. The training these men received in every phase of their complex jobs as pilots, helmsmen, mechanics, gunners, telegraphers, and so on, utilized the best teaching techniques that could be devised. Many lads who used to get poor marks in school were taught to do very technical jobs in radar, engine maintenance, photo reconnaissance and such. These men will expect good training on the job back here at home. It's a very important part of your task, Mr. Foreman, to see that they get it. You know the technique . . . you know how to do it.

1. Bring him up to date on the job. Tell

him about changes in machines and methods. Show him any improvements that have been made since he left. Let him see for himself how your section operates.

2. When he is ready for it, teach him how to do *his* job efficiently. Make it simple, step by step—be sure he understands you. Couple the new job with other work he has done. Instruct him in easy steps that *clearly point out all important details.* Let him ask questions—they are cheaper than accidents or spoiled work. Stand by while he practices the job with you near at hand to help in case of trouble. Correct his mistakes, then stand by again, until he can do the job well by himself. *Good instruction is a very important part of good supervision.*

3. Encourage him to be a *good* workman. A pat on the back for a job well done is tonic for any man. *Then* you can "sandwich in" necessary corrections or improvements that may be needed. Show him evidence that his work is improving. A man works better when he feels that he is doing a good job.

4. Follow through on your job instruction and help. A workman will appreciate your personal interest when you stop by occasionally to see how he is getting along on his job. He will feel more secure and safe if he knows you are not out of reach if he needs your help or advice, and if he knows you will correct him without bawling him out for what he did not know or had not learned well.

The Human Side of Things

You might think that because we are all human beings that it would be natural for each of us to understand people . . . natural for each of us to get along well with others. That is an incorrect impression. We really have to *learn* to understand ourselves, and we have to *learn* to understand others. It takes study—and time—and patience. But it isn't impossible. The right attitude helps. *Understanding people is simple for anyone who has an honest mind and a warm heart.*

If by your ability to understand the veteran who comes back to us, you can smooth his path and help him assume his rightful place again, you will be teamed up with the great physicians who help to heal the wounds of war and tragedy. Yes, that is a big order, all right.

You won't be left alone in the task, however. There will always be sources of help. First of all, your superintendent wants to help you. *Always talk the problem over with him first.* Tell him the facts in the case; tell him what you think might be done. He may decide to call on certain company services:

The *medical department* will be glad to talk to the veteran about any problem he may have concerning his physical health. If the work makes him ill or seems to be bad for him, *he should be sent to the medical department for a checkup.* The company wants him to have good health as well as a job.

The *training and education department* will be able to help on problems involving ways of instructing the veteran about his "new" job. He may need counsel on vocational or educational problems. The training department can help in these cases, too. Whenever such problems arise, feel free to ask for this help.

The *standards engineering department* will be able to offer advice on certain phases of the job setup which might be changed slightly to enable a veteran with some partial disability to work better.

Danger Signs

It would be unreasonable to expect you to understand all the things a psychiatrist must know about people's emotional disturbances and how these ills are linked with physical disturbances. Psychiatry is not part of your job, but you can know enough about certain symptoms of poor adjustment so that you will recognize these symptoms and interpret them for what they mean. Here are some trouble signals to watch for and some notes on what to do about them:

Excessive fatigue: The man may not be as well as he should have been before returning to the job. The job may be physically exhausting, or more likely, the man may be using up too much energy in doing it the hard way. Whatever the cause, he feels "completely worn out."

Check the job, find out if it *is* too hard for the man. Perhaps it can be done easier or more efficiently. If the job itself seems all right, then send the man to the medical department for examination.

Frequent headaches: Headaches may be signs of job dissatisfaction that has brought nervous tension. Bad headaches can also be caused by poor digestion, lack of proper rest, or eye trouble. In any case, a severe headache should be checked up.

Send the person to the medical department. The physician will be able to determine the cause of the trouble. *Do not* tell the man to "take an aspirin"—he may not need aspirin at all.

Dizzy spells: Dizzy feelings may come from faulty digestion, or they may indicate deeper trouble. Sometimes faulty vision makes a man feel dizzy. Whatever the cause of these spells, serious accidents may be the result.

Such cases should be referred to the medical department for examination. Do not give any medicine, "first aid," or "advice" to the person who says he feels dizzy. He needs a physician on his case.

Nausea or vomiting: Ordinarily, a person does not vomit unless he is very ill. He may be sick physically from something he ate or drank. Some persons are nauseated by situations which make them greatly afraid or shock them. Some veteran might be nauseated when an apparently ordinary incident reminds him somehow of a horrible thing he once experienced.

Do not try to "kid" such a person out of his fears or shock. The cure isn't as simple as that. Don't give him any medicine you may think is good. Instead, see to it that he gets to the medical department for professional help.

Irritability: Everybody gets touchy at times. However, if a fellow stays that way for long periods, or blows up over the least things that would not make the average person angry at all, he may be ill. He might be "run down," he might need a better diet. Sometimes the job can be at fault. Outside troubles may have him worn out and worried.

Try to get all the facts—but do it without making him more irritated. (*Bawling out* the angry person only makes the problem *worse!*) If the person does not seem as well as he should be, have him check with the medical department. Perhaps a word from you as foreman about *getting along better with people* might help. Here is a test of your tactfulness.

Discouragement: Inability to do his job *well* often makes a man very discouraged. If this is the cause of discouragement, effective training will help to clear the problem. A change of job may be possible which will bring back a better *feeling of accomplishment* instead of failure.

Show the man how to do the job easier. Teach him in a way that makes him feel more secure and capable at his job. As he improves, show him he *is* doing better. Nothing succeeds like success—*and nothing was ever as gloomy as failure!*

Daydreaming: The change from the hectic and dangerous life in the armed forces to the humdrum daily job and peaceful home-town life may disturb the veteran for months. He may daydream when he should be hard at work. He may loaf. He may play or mess around at the job, spoiling work and endangering his fellow employees.

Perhaps the man needs to be told how important his job is, and why his daydreaming is bad. Scolding won't help. Find the *cause,* if you can, then take steps to remedy the cause of the trouble.

Fooling: Horseplay, teasing, or fooling can become a serious problem in any shop. Safe workmanship is of paramount importance in our plants.

Instruct the man carefully in matters of safety. Good teaching includes giving him the *reasons* for doing the job a certain way, to be safe. Emphasize the personal factor in safety. Everyone wants to avoid injury and loss of income. Do not take for granted that the ex-serviceman will be a safe and careful worker unless instructed well about safety in his specific job.

Moody spells: Return to civilian life may leave the ex-serviceman with gloomy spells. He may tend to withdraw from his friends, he may even let alcohol get hold of him. He may wish he were far away, in different circumstances, and grow moodier by the day.

Be patient. This fellow needs help but he may resent any open attempt to advise him about his problems. *Let him talk to you*—let him tell you how *he* feels, *why* he is depressed. He may need the services of the medical department, with special counsel on the problems that burden him.

Suspiciousness: When any employee becomes suspicious of others without apparent cause, he may react by carrying gossip and tales. Such a person sometimes repays imagined injuries with spiteful tricks. He may even stoop to very mean and dangerous kinds of revenge. Any of these

things can disrupt the morale of a whole section in the plant. Watch for signs of suspiciousness or resentfulness in the poorly adjusted workman.

Help the man rebuild his self-respect and his self-confidence through good on-the-job training that improves his workmanship. Play no favorites, but give this fellow a pat on the back for a job well done. Do not have an ear for *his* tales, and do not let *others* swap gossip with *him*. This problem of suspiciousness usually disappears when the person again feels secure and knows his own job well.

Labels Are Not Wanted

The ten "danger signals" just listed are not confined to ex-servicemen. You have seen these things in many people who never were anywhere near the front line, and never wore a uniform. Some of these symptoms of neurotic tendency can be found in about half the people in almost any group. It is very important to remember this. *Do not label the person who shows these signs as "queer" or "whacky" or totally unlike his fellow creatures.*

Such a label would make it very difficult for anyone to help him. The man who hears that he is "an odd case" will naturally resent it, and probably resist all the harder any change for the better. A wise physician never lets his patient know how dangerously ill he is; to do so might even make the patient worse by adding fear and worry. This same rule is a safe one to follow in dealing with problems of human *feelings and relationships*.

Keep Notes On Your Ex-Servicemen

When the ex-serviceman comes back to your section, Mr. Foreman, and sits down with you in that first interview, get some facts about him. Write them on one of the record cards you have for this purpose. Do this in a way that does not let the man think you are piling up "evidence" against him, but rather that you are taking a personal interest in his well-being.

File this card carefully and add to it any new information on the veteran that comes out in the course of other conversations with him.

On the back of the card, jot down notes on the man's work adjustment and personal feelings which are evident. Keeping these facts in mind will bring you close to the new man and give you valuable insight into his reactions. The foreman who knows all about the ordinary problems a man faces is in an excellent position to prevent other problems rising that may be serious in his own life, and in the lives of others.

Emotionally or physically handicapped ex-servicemen will come back to industry, and we will have our share. If you help these men maintain the right attitude, these handicaps will not be serious.

To a large degree, Mr. Foreman, you must be adviser and counselor to the returned veteran when he needs help and guidance. He wants the best thinking you can apply on his problem.

He will respond best when *he* is *not* considered to be a "problem" but rather as a person who *has* problems that need your skill to be solved.

Have a little faith. . . . Time plus your skill will work the trick.

It's Up To You

You are the one, as foreman, who knows the most about the jobs in your section—what they require in the way of output and effort from the employee. You know the physical and mental requirements on each job. You know the working conditions, the hazards, the particular problems which are involved in each job. You are in an excellent position to help the new employee.

Healthy personal relationship between foremen and their employees was never very far from the top of the list, but now it has become the number one item in good supervision.

It will give you vision for the job to recall that *good soldiers have always made good citizens in America*. You will never regret the planning and effort invested in helping our ex-servicemen become well established in peacetime pursuits. It means a great deal to John A. Roebling's Sons Company, and to you as foreman—but it means *everything* to them.

Make the best job of it possible.

Backgrounds for Discipline

*William L. Hilliard**

In handling discipline cases we are dealing more often with the effect rather than the cause. If we look deeply enough perhaps we ourselves are responsible for much of the trouble which arises in our shops. Through careful analysis of our own particular methods and situations we may be able to make improvements and adjustments which will prevent many of our possible discipline problems from materializing. Consider the following factors.

Discipline implies *order* and that is a key word for the successful industrial-arts teacher. Order not only among the boys but order in the physical aspects of the shop. The room should be arranged in such a way that when a new student enters he should feel, at least subconsciously, that what he sees is the result of both supervision and planning, and that here is a place where he can get things done, and that here is a place where it is going to be a pleasure to work. Just as every tool has a place, so should every boy—not by virtue of command; but because it is obvious to him that there he can accomplish the most with the least effort. How can all this be done? First, clean house. Get rid of the old dusty junk and dirty blueprints. Second, streamline to achieve greater work efficiency.

The second key word is *planning* which is a prerequisite for accomplishment. Before a successful semester begins the instructor must set up objectives for his various classes and the necessary steps which will be taken during the term to reach them. The steps should consist of the projects, exercises, or experiences the students will have. This outline should be typed and posted in a conspicuous place and each boy should be familiar with it. There should be enough information given so that every boy knows at all times just what he should be doing, what he is going to do, and what the goal is that he is working toward. This is the plan; it leaves no room for idleness or mischief. It aims at accomplishment.

Respect is the third key word. It is a feeling which must exist between the successful teacher and his students. Contrary to popular expression it cannot be commanded without being superficial. To be genuine, respect must be earned. Unfortunately, there is no clear-cut means of obtaining this subjective condition; however, there are some suggestions which can be made. Be friendly, laugh with the boys *occasionally*, invite their confidence, and don't betray it. Make them feel you trust them. Be stern when necessary and always be fair. Boys have a high regard for craftsmanship and skill; don't *tell — show*.

Most boys like to do things which require co-ordination of their minds and hands. Some may not be particularly good at this sort of thing, but in spite of that they seem to have a natural desire to make things. Now then, as shop teachers it is our duty, and to our advantage to capitalize on this inherent interest. We must see to it that our students do make things, we must foster their ambitions by having our shops so well organized, our courses so well planned, that they can work and learn without losing interest. What breaks down student morale is to have to wait with several others to use a file which won't cut; or to have to stand around all period waiting for the instructor to get back so that they can find out what to do next; or where the glue is. It is conditions like these that kill the life of the shop program and bring about those disagreeable discipline problems. If bottlenecks similar to those just mentioned exist in your shop you are doing your students an injustice and working a hardship on yourself through the problems which are bound to arise.

This article is not intended as an exhaustive study of the field of discipline. It merely attempts to point out some of the underlying factors which often become invisible from the rut into which we tend to slide. When accomplishment is lacking, and discipline problems arise, look first to yourself and then to the boy.

*San Fernando High School, Los Angeles City School System, San Fernando, Calif.

Teaching Materials for Industrial Education

*Chris H. Groneman**

(Continued from page 354 of the October, 1945, issue)

The following list of teaching aids was collated to help the teachers of the various departments of industrial arts and vocational education.

It is advisable that teachers use school stationery when writing for any of the films listed. Films should be ordered well in advance—several weeks' notice would be desirable. In ordering films it is best to mention a second and third choice in case the first selection cannot be furnished at once. The size of the film should be specified, and the desired date must be given; also an alternate date, if possible.

Prompt return of films is essential to assure available prints for the next exhibitor. A 16mm. sound print must be projected only on 16mm. sound projectors. Projection on a silent machine will ruin the film for all future use.

All films are free unless otherwise noted. Transportation charges must be met in every case. The borrower is required to pay for any loss or damage done to the films in his possession. Where a loan fee is requested, that fee should be included with the order to save time and correspondence concerning this.

Woods (Cont'd.)

New Mexico. Museum of New Mexico, Santa Fe.
North Carolina. Bureau of Visual Instruction, University of North Carolina, Chapel Hill.
North Dakota. Department of Information, North Dakota Agricultural College, Fargo.
Oklahoma. Extension Service, Oklahoma Agricultural and Mechanical College, Stillwater.
Oregon. Department of Visual Instruction, Oregon Agricultural College, Corvallis.
South Carolina. Extension Division, University of South Carolina, Columbia.
South Dakota. Extension Division, University of South Dakota, Vermilion; also Extension Service, South Dakota State College of Agriculture, Brookings.
Tennessee. Division of University Extension, University of Tennessee, Knoxville.
Texas. Visual Instruction Bureau, University of Texas, Austin; also Extension Service, Agricultural and Mechanical College of Texas, College Station.
Utah. Extension Division, University of California, Berkeley.
Vermont. Robert Hull Fleming Museum, University of Vermont, Burlington.
Washington. Extension Service, State College of Washington, Pullman; also Department of Visual Instruction, Oregon Agricultural College, Corvallis.
Wisconsin. Bureau of Visual Instruction, University of Wisconsin, Madison.
Wyoming. Department of Visual Instruction, Oregon Agricultural College, Corvallis.
Alaska. Extension Service, University of Alaska, College.
Puerto Rico. Extension Service, University of Puerto Rico, Rio Piedras.
Block That Termite (2 reels)—16 and 35mm.—Sound
Four Thousand Gifts of the Forest (1 reel—color)—16 and 35mm.—Sound
Harvesting Uncle Sam's Timber (2 reels)—16 and 35mm.—Silent
Pine Ways to Profit (2 reels)—16 and 35mm.—Sound
Prevent Forest Fires:
- Trailer No. 1. A Good Woodsman in the Woods (1/10 reel)—16 and 35mm.—Sound
- Trailer No. 2. How to Build a Campfire (1/5 reel)—16 and 35mm.—Sound
- Trailer No. 3. The Careful Fisherman (1/5 reel)—16 and 35mm.—Sound

The Tree of Life (2 reels)—16 and 35mm.—Sound
Trail Riders of the Wilderness (2 reels)—16 and 35mm.—Silent
American Saboteur (Trailer, 1/5 reel)—16 and 35mm.—Sound
Forest Ranger (3 reels)—16 and 35mm.—Sound
There's More Than Timber in Trees (3 reels—Kodachrome)—16mm.—Sound
Wood for War (½ reel—Kodachrome)—16mm.—Sound
Wood Vital to Victory (1 reel)—16mm.—Sound

Western Pine Association, Yeon Bldg., Portland, Oreg.
- Harvesting the Western Pines—30 min.—16 and 35mm.—Sound
- Fabricating the Western Pines—35 min.—16 and 35mm.—Sound
- Building a Home With Western Pines—25 min.—16mm.—Sound

Weyerhaeuser Sales Co., First National Bank Bldg., St. Paul, Minn.
- Trees and Men (1- and 4-reel versions)—16 and 35mm.—Sound
- Trees and Homes (3 reels)—16 and 35mm.—Sound

Plastics**

American Phenolic Corp., 1830 South Fifty-fourth Ave., Chicago, Ill.
- Synthetics for Electronics (catalog)

American Plastics Corp., 225 West 34th St., New York 1, N. Y.
- Rennet Casein in Making Ameroid (chart)—15 cents
- Educational Sample Kit—$1

Bakelite Corp., Advertising Dept., 300 Madison Ave., New York 17, N. Y.
- Bakelite Horizons
- The Story of Vinylite Plastics
- A Simplified Guide to Bakelite and Vinylite Plastics
- Molding Technique of Bakelite and Vinylite Plastics—$1.50
- The Fourth Kingdom (film)—28 min.—16mm.—3 reels Sound—4 reels Silent

Baker Oil Tools, Inc., P. O. Box 127, Vernon Station, Los Angeles 11, Calif.
- Baker Casting Resin (Instruction Sheets)

The Barrett Division, Allied Chemical and Dye Corp., 40 Rector St., New York 6, N. Y.
- Chemicals for Industry

Breskin Publishing Corp., 122 East 42nd St., New York 17, N. Y.
- The Magic of Modern Plastics (4 reels)—16mm.—Sound—40 min.—transportation charges both ways
- This Plastic Age (film)—approx. 30 min.—16mm.—Sound—transportation charges both ways

Catalin Corp., 1 Park Ave., New York 16, N. Y.
- Catalin (plastic reference guide)
- The Production of Catalin (film)—400 ft.—16mm.—color—Silent

Celanese Plastics Corp., 180 Madison Ave., New York 16, N. Y.
- Celanese Plastics[7]
- Mounting Lumarith in Aircraft[7]
- Fabricating Methods for Lumarith, Celluloid, and Similar Thermoplastic Materials—$1
- Shop Book, Forming and Fabricating Aero-Quality Lumarith[7]
- Celanese Synthetics for the Electrical Industry[7]
- Lumarith, A Celanese Plastic for Packaging[7]
- Proving Ground (plastic packaging)—25 min.—16mm.—Sound—black and white[8]
- Cellulosic Plastics (film)—approx. 30 min.—16mm.—Sound—color[8]

Columbia Rope Co., Auburn, N. Y.
- Co-Ro-Lite

The Dicalite Co., 520 North Michigan Ave., Chicago, Ill.
- The Diatom
- Dicalite—Aids to Industry (small)
- Bulletin E-40
- Three samples of filler powder

Dow Chemical Co., Midland, Mich.
- How to Put Dow Plastics to Work
- Chemistry Is the Foundation of Good Packaging
- Packaging Metal Products
- Saran

*Industrial Education Department, A. & M. College of Texas, College Station, Tex.

**Acknowledgment is made to Sgt. E. E. Stark of the Bryan, Tex., Army Air Field, for his assistance in the compilation of the materials on plastics.

[7]One complimentary copy will be supplied free for each school or class.

[8]School assumes responsibility for condition of film and reships it prepaid and insured.

Saran Pipe
Saran Tubing
Saran for Injection Molding
Saran Film
Styron
Styraloy
A Short Guide to Better Packaging
User's Guide—Stripcoat
Assorted Information Sheets:
LT Ethocel
Ethocel TF
Ethocel Sheeting

E. I. Du Pont De Nemours & Co., 626 Schuyler Ave., Arlington, N. J.
Du Pont Plastics
Plastics for Commerce
Plastics
Some Worthwhile Reading on Plastics

Durez Plastics and Chemicals, Inc., North Tonawanda, N. Y.
Durez Product List
Durez Plastic Bulletin
It's a New Business Custom
Entirely Business—$1

The Formica Insulation Co., Cincinnati, Ohio
Formica Parts for Airplanes
Gear Book
Data Book
What Formica Is
Formica Plastic Surfaces
The Formica Story (film)—45 min.—Sound—Color

Garfield Mfg. Co., Garfield, N. J.
Why Gummon

General Electric Co., Plastics Division, 1 Plastics Ave., Pittsfield, Mass.
Textolite
Design Data on Plastics
Silent Gears
Mycalex
Sample kit available for exhibit purposes in classroom upon request on school stationery

Glyco Products Co. Inc., 26 Court St., Brooklyn 2, N. Y.
Chemicals-Glyco

B. F. Goodrich Co., Akron, Ohio
Koroseal
Samples of Koroseal

The Goodyear Tire & Rubber Co. Inc., Akron 16, Ohio
(*See* United States Plywood Corporation)

Hercules Powder Co., 900 Market St., Wilmington, Del.
A Quick Trip Through Hercules Land
Why Cellulose Plastics?
Check List on Plastics From Nitrocellulose
Big News in Lacquer (the story of high-solids lacquers)
A Chronology of Papermaking in the United States
Safety Instructions in Chemical Laboratories (poster)
Electronic Tools in Chemical Research

Hood Rubber Co., Boston 72, Mass.
Avtex
Arragin

The Hydraulic Press Mfg. Co., Mount Gilead, Ohio
Bulletin 4403
Bulletin 4404
Bulletin 4405
Bulletin 4411
Bulletin 4502

International Theatrical and Television Corp., 25 West 45th St., New York 19, N. Y.
12th Edition Catalog of Entertainment and Educational Subjects
Teachers' Guide to Educational Shorts
Technique of Lucite Carving (film) (1 reel)—10 min.—16mm.—Rental, $1.50

Laucks, Inc., Lockport, N. Y.
Lauck's Glues Go to War

Lusteroid Container Co. Inc., 10 Parker Ave., South Orange, N. J.
Bulletin—Lusteroid Vials and Tubes
Five samples of Lusteroid tubes

The Luzerne Rubber Co., Trenton 9, N. J.
Hard Rubber Equipment for the Chemical Process Industries (Catalog)

Marbon Corporation, 1926 West Tenth Ave., Gary, Ind.
Marbon S and S-1 Resins (booklet)
Samples:
2 lb. Marbon S
2 lb. Marbon S-1
1 gal. Marmix—Resin-Water Disperaion

Elmer E. Mills Corp., 153 W. Huron St., Chicago 10, Ill.
Injection Molded and Extruded Plastics
Pipe and Fittings
Tubing and Fittings

Monsanto Chemical Co., Plastics Division, Springfield 2, Mass.
The Family of Monsanto Plastics
Resinox
Lustron
Swatch samples of Monsanto Plastics
Technical Bulletins
The Magic of Modern Plastics (film)—28 min.—16mm.

The Rayon Processing Co., 86 Tremont St., Central Falls, R. I.
Samples of plastic fillers:
Filfloc—a cotton filler flock used as a filler
Fabrifil—a chopped rag filler
Cordfil—a cut cord filler
Raytellics—a metallic filler used for decorative purposes

The Resinous Products and Chemical Co., 222 W. Washington Sq., Philadelphia 5, Pa.
Amberlite pr-14 Hot Pressing Studies
Flexible Bag Molding of Curved Plywood
Government Specifications
Edge Gluing and Taping of Plywood Veneer
High Density Wood
Redux
(Small supply of above bulletins on hand. Distribution limited to technical workers.)

Resistoflex Corp., Belleville 9, N. J.
Resistoflex-Protective Clothing
Resistoflex-Hose
The Compars
Assorted samples of Resistoflex Materials

Rohm & Haas Co., Washington Square, Philadelphia 5, Pa.
Plexiglas—fabricating manual
Plexiglas—general applications
Plexiglas (film) 20 min.—16mm.—Sound—loan fee

Shawinigan Products Corp., Empire State Bldg., New York 1, N. Y.
Gelva Resins (bulletin)
Gelva Emulsions (bulletin)
Alvar (bulletin)
Formvar (bulletin)

Synthane Corp., Oaks, Pa.
Various pamphlets on Synthane

Taylor Fibre Co., Norristown, Pa.
Taylor—laminated plastics

Tennessee Eastman Corp., P. O. Box 511, Kingsport, Tenn.
Tenite (booklet)

Thiokol Corp., 780 North Clinton Ave., Trenton 7, N. J.
Synthetic Rubber Molding Powder (2-page leaflet)
Preliminary Report on the Compounding and Processing of "Thiokol" ST (5-page report)
Thiokol—America's First Synthetic Rubber
Type FA—Technical Analysis of a New Type of "Thiokol" Synthetic Rubber

United States Department of the Interior, Bureau of Mines, 4800 Forbes St., Pittsburgh 13, Pa.
List of Motion Picture Films of the Bureau of Mines, 1945

United States Plywood Corp., 616 West 46th St., New York 19, N. Y.
Technical Data on Pliobond Adhesive
USP Low Temperature Phenolic Resin Glue with Powder Catalyst (4-page descriptive outline)

University of Kansas, Lawrence, Kans.
Fourth Kingdom (4 reels)—40 min.—16mm.—Sound—50 cents
Rayon (3 reels)—30 min.—16mm.—Sound—50 cents

CLUBS — CONSERVATION — COMMUNITY

BERNARD HAGEN*

For many seasons the subject of club activities has, no doubt, been dinned into our ears. Should we have the same club again this year? Might something new change the temperament with which we go about our daily work? How about this conservation business this year? How can our activities serve school, student, and community? All of these questions have a familiar sound to the ears of teachers. If they haven't don't read any further.

The conservation club in the Washington Junior High School in Manitowoc has survived several seasons and for some unknown reason it seems to have acquired a growing impetus which carries it over from year to year. During the past school year the program was enlarged and new interests were in evidence. The boys, through their teacher sponsor, established a close contact with the local Fish and Game Protective Association. With the help of this organization the boys constructed game feeders which were placed in wooded areas where wild life of several forms existed. All material for these feeders was furnished by the Fish and Game Association. When the feed-

*Washington Junior High School, Manitowoc, Wis.

ers were completed they were labeled, registered, and one taken by each member to the place selected for the winter feeding program. Before the winter had started each boy in the club had a feeder of his own construction out in the woods and he supplied it regularly with feed furnished by the Game Association.

This club project, it was felt, was a connecting link between school and community. The men in the Game Protective Association have taken a strong interest in the work and many have expressed their desire to help extend this program to other schools. This work gives the boys in school an interest in a community function and the sponsors hope that in later years they will be conservationists and sportsmen of the best kind. Boys of most moderate means are members in this club because to date the entire expense for materials and feed is borne by the Game Association. A fine attitude is in evidence and new ideas and activities are constantly in the making.

There are those who feel that too much is done for the boys in this plan, but as the weeks roll by and each boy goes into the woods with feed to take care of the pheasants, birds, rabbits, squirrels, and other wild life, one will readily see that the program is entirely dependent upon the initiative and reliability of the individual boy. It makes him feel that some form of life is dependent upon him and that he must not miss his chance to do some good. It is true that the boys do not share in the expense, but they realize that because of their labors the wild life in the woods is given a chance to survive. The Fish and Game Association is happy to furnish needed materials because it aids and strengthens their winter program of wild life protection. All in all the project has made, and is making new friends. Clubs, conservation, and community are all in one.

The Implications of Industrial Arts for General Education

*Towne R. Abercrombie**

For many years we have talked and read of integration between industrial arts and other school subjects which are considered as basic in our modern school curriculum. Too much of this has been wishful thinking, however, and too little actual accomplishment. Much of this failure to integrate industrial arts and other subjects is traceable to the fact that our entire school system has been established upon the premise that science is science, mathematics is mathematics, industrial arts is industrial arts and "never the twain shall meet." Our teachers' colleges have built up this subject prejudice and our school administrators have too often permitted it to flourish in our schools. The pattern of least resistance has been a governing factor. This does not apply specifically to teachers of academic subjects alone—it is also a very serious fault of teachers of the so-called "special" subjects.

Industrial arts is peculiarly appropriate as a sound educational basis for education which stresses the training of the *whole* child. It does not necessarily confine itself to the training of boys. Its functions and its values also apply to girls. Industrial arts as a specific shop experience alone, however, does not train the *whole* child. It becomes narrow in its scope as does any other subject field under similar circumstances. This narrowness and prejudice must be removed from the various subject fields if integration is ever to take place. This will mean that subject teachers must become more versatile and that our teachers' colleges stress education of the whole child as the most important phase of their training program as well as offering the facilities for such training. Finally, the school administrator must make the complete education of the youth in his school a paramount consideration and must make such program adjustments as are necessary to insure this.

Subject prejudice has created one of the great failures in our whole educational system. This is in evidence from the kindergarten through the universities. Our teachers are trained for specifics—they fail to see the development of the whole child. Our schools permit special training in special subjects without due consideration to the complete education of the boy or the girl. This, it seems, is human nature. A fine, outstanding boy or girl too often receives special recognition upon completion of a school career because of his or her ability as an artist, an athlete, or a musician. This is fine if the artist, the athlete, or the musician has also been trained to live. Education for life is so much more important than education for music, for art, or for athletics. Art can make life more interesting, as can music. He-man abilities to perform on the field or the court are valuable assets but are these qualities sufficient in themselves?

In the light of the foregoing how can a program of integration take place? Simply by unified opinion on the part of teachers of all subjects that the complete education of a child is a common problem, not the individual responsibility of one teacher or one group of teachers. Training in the 3 R's is not sufficient in itself nor is training in one of the various arts sufficient if this training is given and general considerations are excluded. There is a place for specialization but it is not in the elementary or the secondary school.

The teachers concerned with science, mathematics, literature, music, art, or industrial arts must come together for discussion and planning of a common problem. They have a common goal—that if a person is to be educated for life in this modern world he must be responsive to the many-sided appeal and the full significance of life itself. The first and most essential problem which will confront this group will have nothing immediately to do with new devices or arrangements, with new courses of study or with any definite pattern of integration or the implications of one subject for another. These factors will develop at a later date *if the fundamental considerations are met*. The all-important factor is to see that the content and the technique of all subject fields are not ends in themselves but are a means toward a common goal—a complete education.

As stated previously this scheme will require a greater degree of versatility on the part of all teachers. Every teacher, for example, must become a teacher of English whether that teacher is officially designated as a teacher of English, of science, of music, or of industrial arts. It is true that every school subject involves a special type of thinking with its own basic concepts. It is equally true that complete education is a basic and all-important aspect in the lives of boys and girls and their thinking must be turned from specifics to generalities. The implications of one subject to another must be developed. Boys and girls do not live by specifics. They live by overall knowledge and understanding.

It has always been the contention of the writer that special subject terminology can best be taught by the teacher of the subject in question but in this instance, as well as in others mentioned the teaching must not be narrow and specific but broad in its scope. A plane, to the teacher of industrial arts, is a tool. A plane to the draftsman represents something entirely different. To a botanist a plane may be a tree. Plane geometry is a subject in itself. A plane, to boys and girls, is a flying machine. An important part of the airplane is the plane. Each is a specific term and is taught as such by the teachers of the various subjects which are involved. To a person who has not studied botany a plane is either a tool or a flying machine, and in the minds of others plane geometry may mean geometry which has to deal with a tool or an airplane. The meaning of the word is broad and belongs to no one particular school

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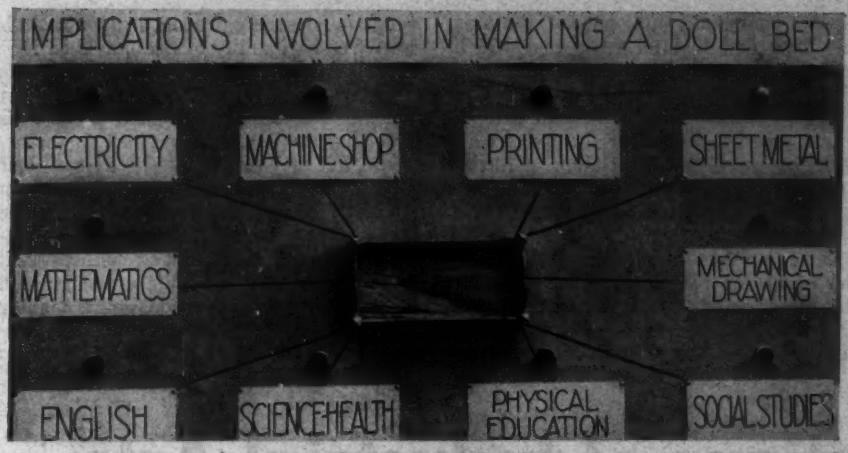

subject exclusively. The word has only the meaning which a person pours into it out of his own experience. If the word is taught as a specific word relating to but one subject field the teaching is narrow and confusing. There are other concrete meanings which should be solidly anchored to the student's own experience through demonstrations, objects, pictures, charts, diagrams, discussion, contrasts, and implications.

The foregoing presents a simple illustration of what can be done when a group of teachers come together for the discussion of a common problem. It would be possible to give thousands of similar illustrations but these should be evident.

Another simple experiment has been developed in the writer's school which has served to focus attention upon the implications of one subject for another. In this instance a simple doll bed was used, and several subjects, both academic and shop, were selected for integration purposes. It could just as well have been a problem in mathematics or an experiment in science. Pupils and teachers alike have been amazed at the results. A science teacher stated, "I have taught science for a good number of years but I never saw the implications of science for other subject fields until today." One youngster, not overly adept with either hands or mind, startled the whole department with the remark, "The doll bed is made wrong. I wouldn't want to give my little sister one of them for she might fall on the pointed legs and put her eyes out." He had not thought of this while engaged in the manufacture of the bed. It was only when he studied the implications involved with science and health that he made this discovery which confounded the supervisor and the teachers who had designed and manufactured the bed in mass production for a number of years. Although the boy might have been classified as *weak* in specific subject matter, his conceptions were broad when actually confronted with the broad implications of the job in question.

As stated in the foregoing, this arrangement of the implications of one subject for another does not immediately call for new courses of study or new devices. It does call for a unified approach to an all-important aspect of our educational system. It means that the approach to specific problems or specific subjects should not be an end in itself — the final outcome must include all of the broader phases that are involved.

A word is a symbol and a line is a sign or a symbol; yet both may have the same meaning. The word *invisible* refers to something which is not visible under certain conditions. The broken line - - - - - - also means something which cannot be seen under certain conditions. The student of English writes his composition which involves the use of the word while the student of drafting executes his drawing which involves the use of the line. Both are exact in their expression of a fact and both are speaking an exact language. The word and the line have meaning only through experience and are simple examples of the dual use of symbols and signs which express facts.

The general conclusion for complete education is clear. Industrial arts, English, science, and all other school subjects have a vital place in preparing boys and girls to live. Each subject must have a place of high position in a school curriculum which is responsive to realities. Each subject, however, must not be an end in itself but must be a part of the whole. This will involve a revolution in pedagogical treatment, for there will be little specialization in the scheme of general education below the college level. The implications of the foregoing for general education—an education for the whole child—must be kept clearly in mind.

Training for Small Business Operation

*Donald K. Beckley**

While the provisions of the widely publicized Public Law 346—*The Servicemen's Readjustment Act*, or "The G. I. Bill of Rights," concerning free education for discharged servicemen have drawn the greatest interest of educators, there is another feature of the bill of particular concern to those working in vocational education. This is the provision of guaranteed loans for servicemen, which will undoubtedly aid in encouraging many veterans to go into business for themselves. This article has been written to suggest the part educational institutions can take in providing the training needed by these new businessmen as a part of their adjustment to civilian life.

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The Loan Provisions of the G. I. Bill

Under the G. I. Bill, loans are available to servicemen who have served for ninety days or more in the armed forces or have been discharged for service-incurred injury or disability. These loans are available for: (1) the purchase or construction of homes, (2) the purchase of farms and farm equipment, and (3) the purchase of business properties. The Veterans' Administration will guarantee up to 50 per cent of a serviceman's loan, but in no case will guarantee more than $2,000. The Veterans' Administration will pay the interest for the first year on the part of the loan which it guarantees, and the loan must be repaid in full in not more than twenty years. A provision which may cause some difficulty in securing loans through banks is that the rate of interest cannot be more than 4 per cent. The conditions under which the loan will be made are: (1) that the loan is used for the purpose stated by the serviceman, (2) that there seems a good prospect of repayment in the light of the serviceman's anticipated income and expense, and (3) that the purchase price is not more than the normal value. Application for a loan must be made within two years of the end of the war or of the veteran's discharge, whichever is later.

The Hazards of Small Business Operation

In spite of the care the Veterans' Administration plans to take to insure that a serviceman has a good chance for success before approving a loan, there are a number of pitfalls which will undoubtedly keep the failure rate of new businesses a high one as it always has been. Perhaps the basic cause for the failure of so many new businesses is the feeling shared by so many prospective proprietors that it is relatively easy to make money when working for

yourself. It is an especially serious temptation for those who have spent several years in the armed forces, often under strict or at least confining military discipline, to believe that everything would work out beautifully if only they could "be their own boss." Obviously, it is not that simple, and operating one's own business presents many problems that an inexperienced person might not anticipate. The National Cash Register Company, which has carefully studied the many problems of small business operation, has estimated that more than 80 per cent of business failures in the United States are from causes which are essentially the fault of those failing.[1] The most frequent of these causes are incompetence and lack of adequate capital. Other reasons are inexperience, unwise granting of credits, neglect of the business, fraud, speculation, and extravagance.

What is being done to help our servicemen avoid these pitfalls as small business owners? One source of information is the United States Armed Forces Institute, which provides a wide variety of correspondence and self-study courses for servicemen, including the organization and operation of the small business, business law, bookkeeping and accounting, retail merchandising, and advertising. Where facilities are available and sufficient interest is shown, courses are taught as classes, with an instructor, the text materials being supplied by the USAFI.

Directed particularly toward prospective small business owners are a series of booklets prepared by the Department of Commerce with the assistance of various trade associations. These booklets, soon to be made available through the USAFI, discuss in practical terms the problems of getting started in business, selecting a suitable location, and other pertinent subjects. An indication of their specialized nature can be obtained from a partial list of titles: *Sawmills, Dry Cleaning Establishments, Metal Working Shops, Auto Repair Shops, Filling Stations, Heating and Plumbing,* and *Shoe Repair Shops.*

What Civilian Institutions Can Do

Correspondence courses and booklets containing practical business suggestions can be most helpful, but, of course, they do not provide the complete answer to how adequate training can be provided in small business operation. Educational institutions are in a position to offer outstanding service in this connection, and they must make their plans now if they are to be most effective.

It is impracticable to attempt to offer courses in each of the many areas of small business operation, since no average-sized institution is likely to have enough students to warrant separate treatment of the great variety of small business enterprises begun each year. All of these projects have enough features in common, however, to justify the preparation of a basic course in small business operation in which should be taught the principles of retail operation and management which apply to all enterprises. It seems clear that business failures occur more frequently from lack of adherence to the general principles of good business operation than from mistakes concerning the specific skill required in that particular business. Thus the auto mechanic is more likely to fail because he does not price his work properly or because he does work on credit for the wrong people than because he does not know how to repair automobiles, although, of course, there are exceptions.

As a part of a course such as that suggested here, or as a separate course, material on store record keeping should be presented. Many small businessmen are unable to know how well they are doing in business because they do not keep the proper records. The result often is that they fail for reasons they might have corrected had they kept records which could supply details of profit and loss in each of the divisions of their operations.

It is suggested that instructors contemplating the introduction of such courses examine the USAFI offerings and the Department of Commerce booklets mentioned earlier in this article. The fact that ex-servicemen may have carefully read this material does not necessarily mean that courses of instruction presenting this material in a classroom situation would not be effective.

In conjunction with a program of one or several courses in small business operation, it might be possible for an educational institution to set up an advisory service for new small businessmen in the form of a seminar on individual business problems, or a series of open meetings for the exchange of ideas and solutions to difficulties faced in business. Possibly the services of some successful small merchants could be obtained for talks to these groups and for practical aid in setting up courses.

Another possible approach to this problem is through presenting some specialized material on small business operation in the individual technical courses. Thus in a course in radio mechanics, for example, a short time might be devoted to business problems faced in operating a radio shop. Possibly this material could be made optional. It might also prove desirable to offer some training in salesmanship to students taking technical subjects who are interested in the business prospects of their specialty.

These suggestions are general ones, but it is hoped that they can provide the basis for constructive planning along the lines indicated. The small business owner has hitherto received far less help from educational institutions than the employee of larger organizations, and there have been few courses set up to help the small businessman. The return of so many servicemen to civilian life as small business owners emphasizes the need for some training, and presents to education a fine opportunity to be helpful in this large area of vocational training.

Industrial-Arts Laboratory, Chicago Public Schools, Dr. Louis Newkirk, director, Bureau of Industrial Arts

[1] National Cash Register Company, Dayton, Ohio, *Better Retailing,* Eleventh edition, 1941, Chapter I.

Problems and Projects

MAGAZINE BASKET

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Magazine baskets have become an essential part of living room furniture. One which matches the design of other furniture in the room is preferable and can usually be obtained without difficulty.

The magazine basket shown here will be particularly welcomed by Colonial period enthusiasts. Conforming to Colonial design, it is simple in construction, with the time-rounded edges and corners aged artficially by skillful cutting in the proper places. The curves on the sides may be varied to match any design of furniture with which the magazine basket is to be used.

Although mahogany was selected for the model shown in Figure 1, any of the cabinet woods may be used. It might be necessary to join two pieces to build up to the required widths, if wide stock is not obtainable.

Lay out the end pieces as shown in Figure 2, and band or jig saw to shape. Cut a groove with a router ⅜ in. deep, ⅜ in. wide, 10¼ in. long, starting 2¾ in. from the edge and 1⅝ in. up from the bottom, on one end piece. The other end piece requires a groove, starting from the same point but from the opposite side, using the foregoing dimensions. See end view in Figure 2. After laying off and cutting the angles of the end pieces, they are rabbeted to take the sides. The width and depth of the rabbet joint is ⅜ in. Make these cuts the entire length on the inner side of both end pieces.

Two identical side pieces are laid out and cut to shape as shown. The top outside edge along the curve can be made to resemble time-worn edges by undercutting the deep part of the curve. The sides should be carefully fitted to the rabbeted joint of the end pieces, before assembling.

Fig. 1. Magazine basket

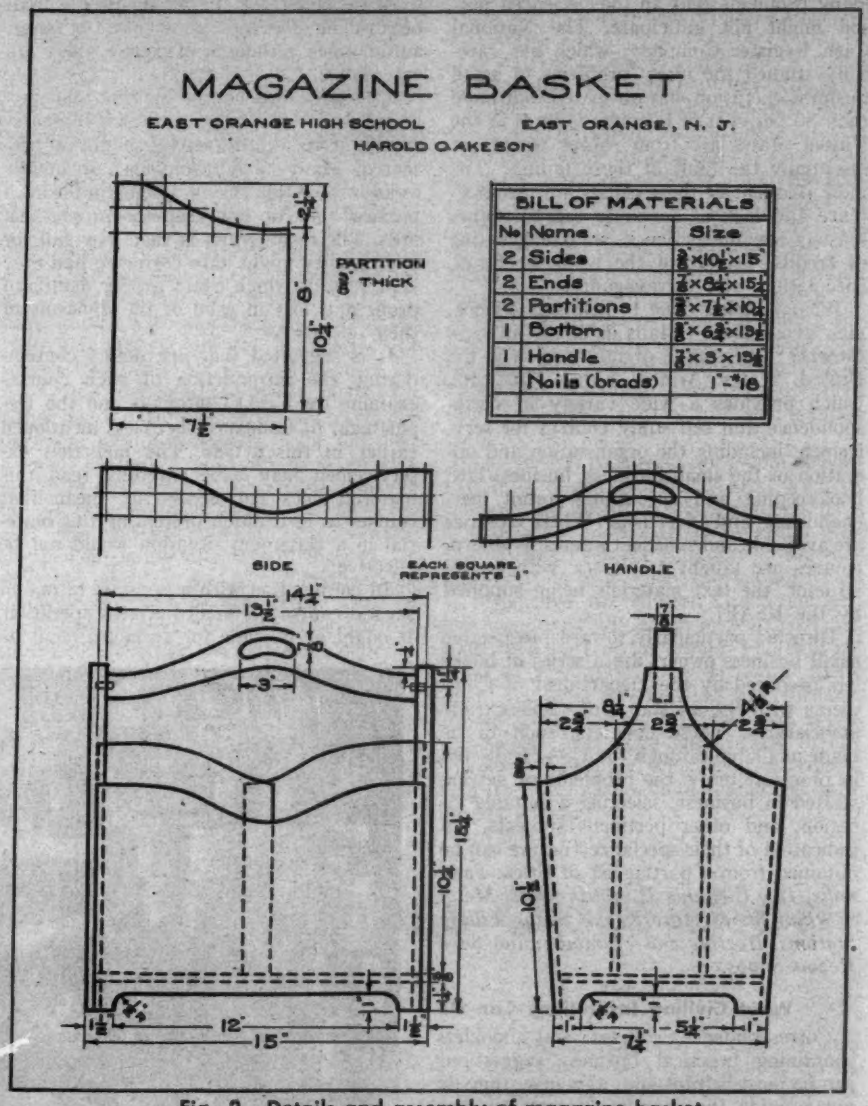

Fig. 2. Details and assembly of magazine basket

The handle is laid out, cut to shape and doweled to the end pieces with ½-in. dowels. All edges of the outside corners and the center portion of the handle should be rounded. Also sand other parts to remove sharp edges and corners, except where joints occur.

Assemble the parts with glue and brads, to fasten them together. Fill all nail holes with a paste made of sandpaper dust of the wood used, and glue. When dry, smooth over with sandpaper. When the job is stained, these nail holes will hardly show. Finish by filling and staining. When dry, apply three coats of thin white shellac, and rub down with fine steel wool, between coats. Finally polish with wax.

DRAWING-INK BOTTLE HOLDER

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Fremont, Ohio

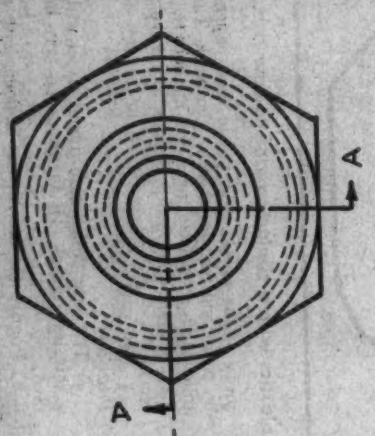
This project affords a close correlation between machine shop and related subjects, such as drawing, mathematics, pattern, and foundry work.

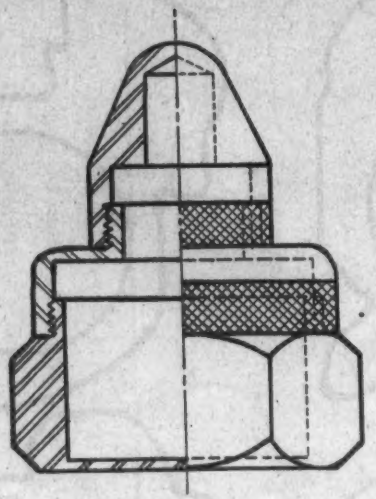
It also is useful as well as interest creating, and is in the financial reach of every student.

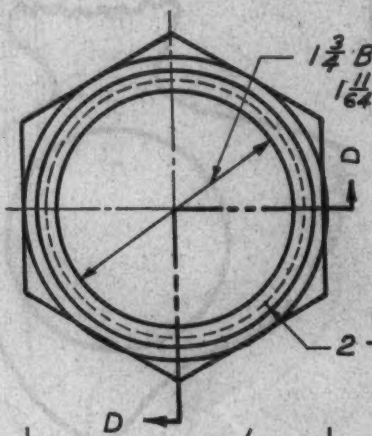
Materials used can be aluminum, brass, cast iron, or steel. If not cast, standard hex stock can be used. Weight is not so important, as the bottle holder will likely not be carried aroumd and the extra weight will serve as a means of preventing the ink bottle from toppling over.

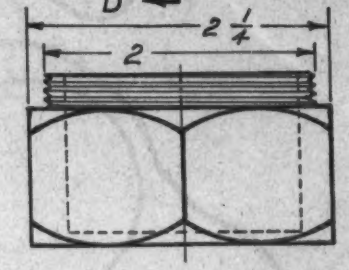
The illustration shows that the outstanding manipulative machine-shop operations, which can be incorporated on a job sheet basis, are

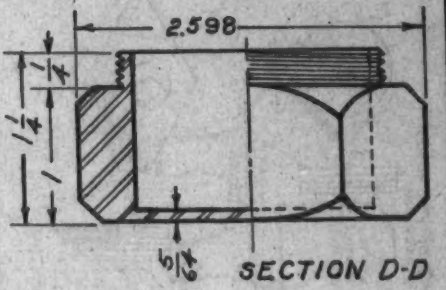
DETAIL AND ASSEMBLY OF INKWELL HOLDER

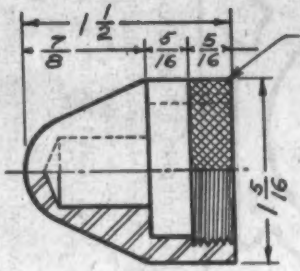


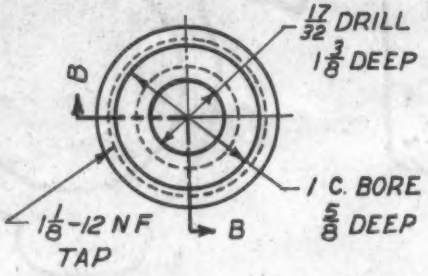


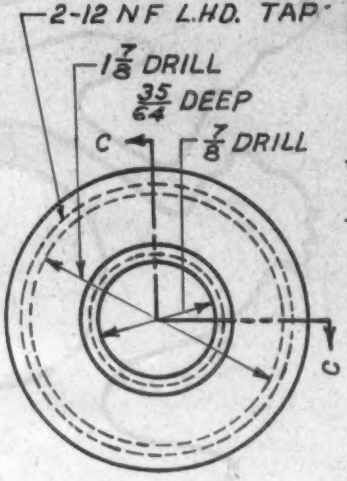


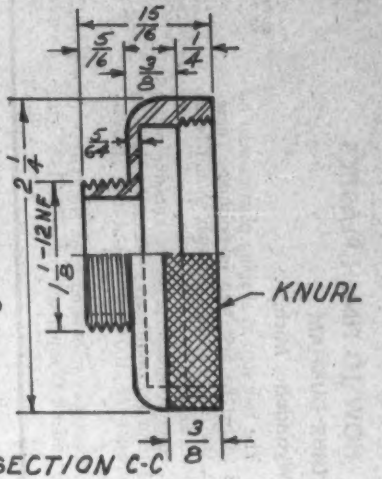












drilling, boring, facing, turning (straight, taper), threading (external, internal; left, right), knurling, and inspection.

HOW TO FINISH PLASTICS

ARTHUR DUNHAM

Wyandotte, Mich.

1. The last step in shaping plastics may be said to be the first step in finishing. Therefore, the final cutting operation should be as smooth as possible.

2. Smooth with a grade of abrasive paper finer than the tool marks — usually No. 2/0 sandpaper or 100 grit wet-or-dry abrasive paper.

3. Continue smoothing with No. 4/0, 6/0, 8/0, and 10/0 sandpaper or with 150, 220, 280, and 400 grit wet-or-dry. Plastics have no grain and may be sanded in any direction — usually in a circular motion or at right angles to previous scratches.

Buffing

On motors which carry two buffing wheels, apply the plastics buffing compound on only one wheel. Keep the other wheel clean and use it for polishing only. See Figure 1.

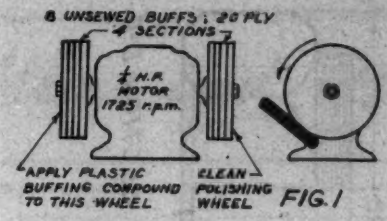


FIG. 1

FIG. 2

FIG. 3

On motors which can accommodate but one buffing wheel, apply the compound to one half of the face of the wheel and keep the other for polishing operations only. See Figure 2.

4. Apply light pressure while buffing, and keep plastics moving to avoid burning. Power buffing produces a glass-smooth, brilliant finish.

Hand Polishing

5. *Ashing.* Nail a piece of felt or carpet to a board as shown in Figure 3. Make a *mud* of No. 2/0 or FF pumice and water. Rub plastics over the mud board with a circular motion.

6. Prepare a similar board and use rottenstone and water as an abrasive.

7. Apply automobile body cleaner with a damp cloth pad.

8. Polish briskly with a dry clean cloth. Hand polishing produces a smooth, satin finish.

FIVE METHODS OF TRANSFERRING DESIGNS TO LINOLEUM BLOCKS

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Very few people are talented enough to draw designs directly onto linoleum blocks. A majority of the people must create their designs on paper and transfer them to the block. The following is a brief outline of five methods that may be used to transfer designs to linoleum blocks.

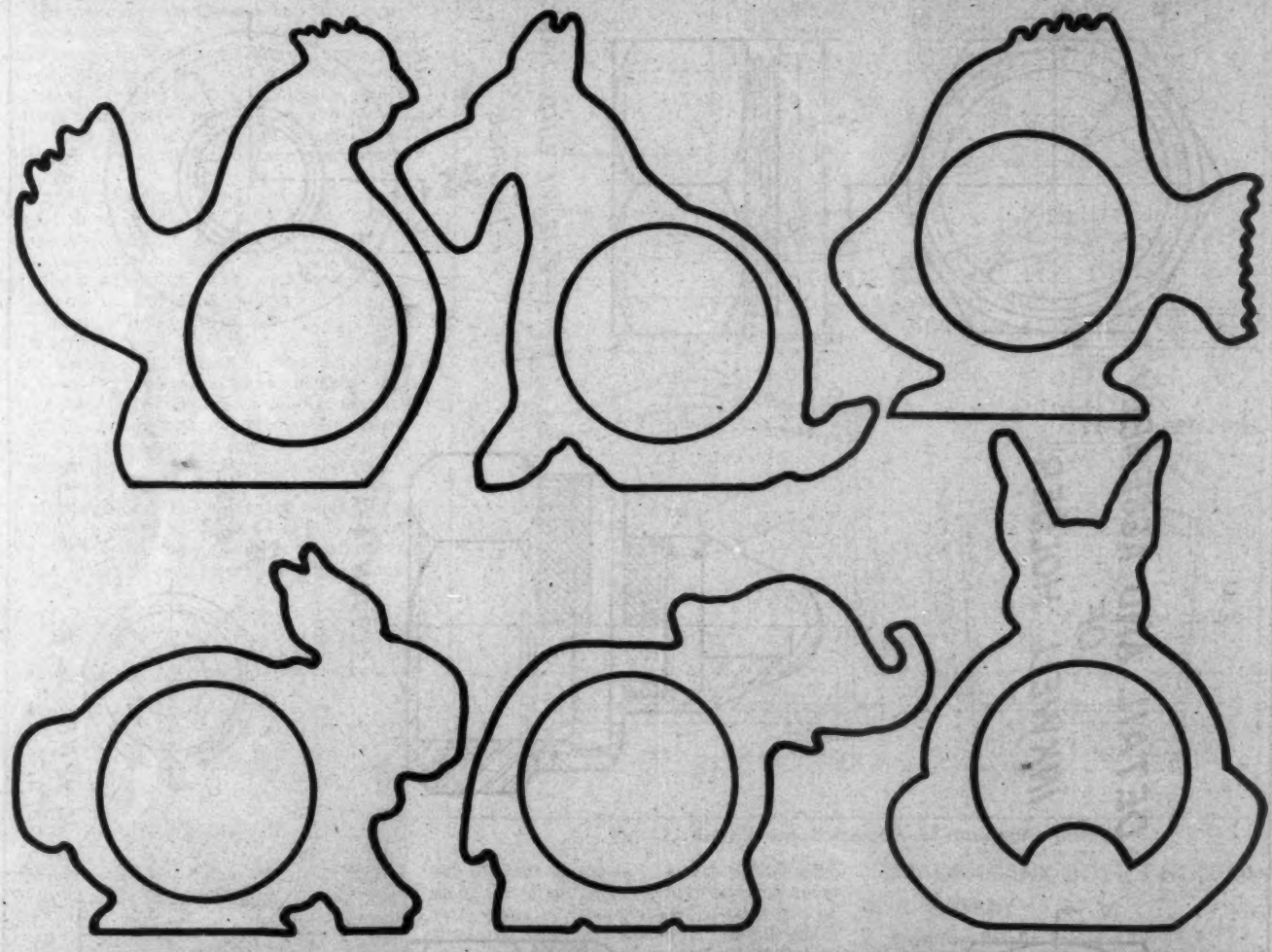
1. Soft lead transfer

Procedure:

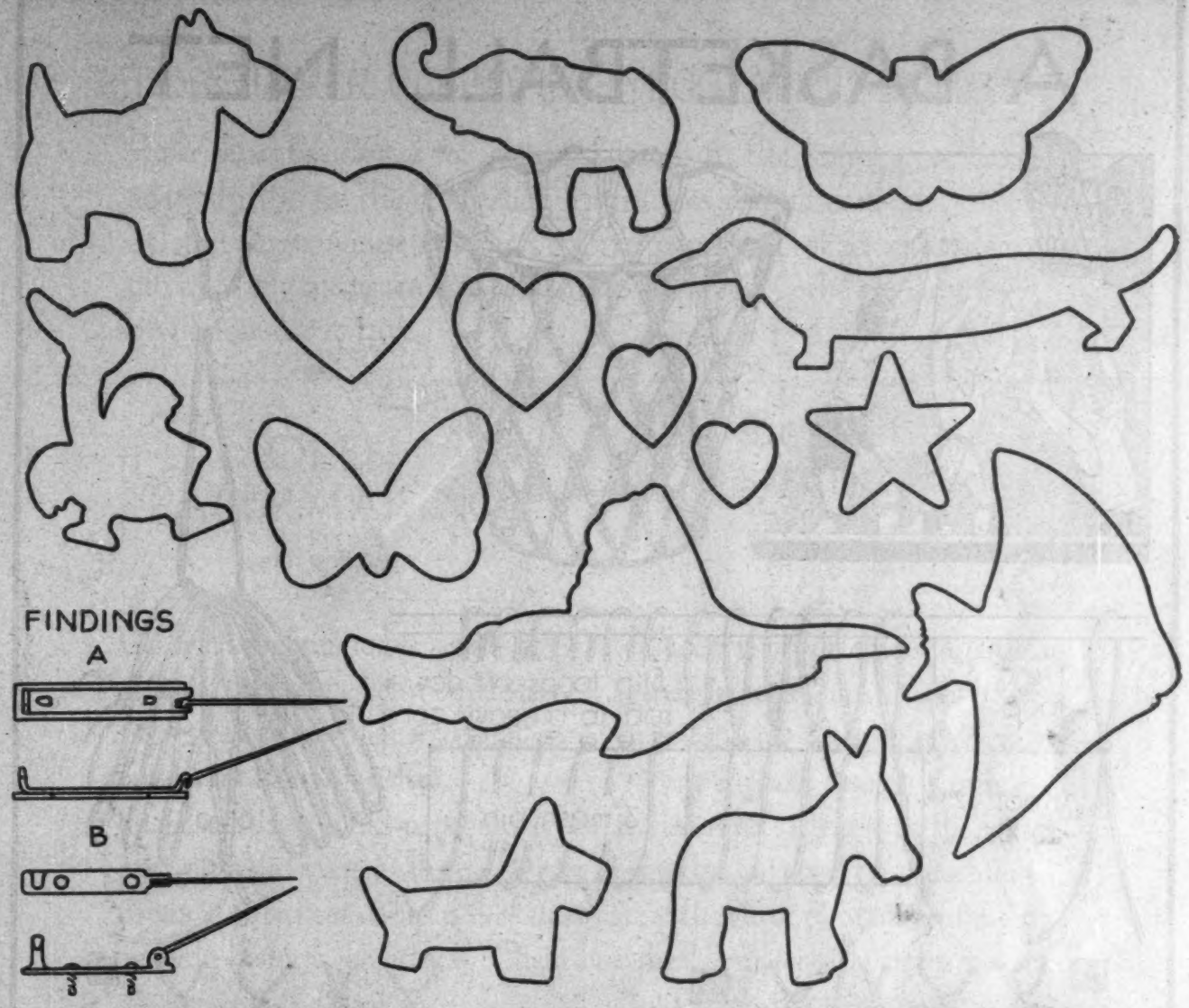
a) Trace the design onto tracing paper with a soft lead pencil (4B to 6B pencil may be used).

b) Prepare the face of the linoleum with a coating of white lead or show card white and allow to dry.

c) Place tracing *face down* on the prepared



Plastic napkin holders sliced from plastics castings or cut from ¼-in. sheet plastics with a coping saw or jig saw



surface of the linoleum and fasten to block with gummed tape.

d) Rub the back of the tracing with the bowl of a teaspoon or similar rounded object and the design will transfer, in reverse, to the face of the linoleum.

e) Remove the tracing paper and trace the transferred lines with a pencil and cut the block.

2. Ditto transfer

Procedure I:

a) Trace the design onto tracing paper using ditto ink or ditto pencil.

b) Prepare the surface of the linoleum as described in item 1-b.

c) Place the tracing, face down, on the prepared white surface of the linoleum and fasten to block with gummed tape.

d) Moisten the back of the tracing paper *slightly* and the design will transfer, in reverse, to the face of the linoleum.

e) Remove the tracing paper and cut the block.

Procedure II (Ditto gelatin needed):

a) Trace the design onto tracing paper using a sharp pencil.

b) Place the tracing, face up, over a sheet of ditto carbon paper transfer surface up. Retrace the design; this produces a ditto carbon of the design.

c) Transfer the carbon to a ditto gelatin sheet.

d) Prepare the surface of the linoleum as in 1-b above.

e) Place prepared surface of linoleum over the design as it appears on the gelatin and the design will be transferred, in reverse, to the surface of the linoleum. Cut the block.

Note: This procedure is especially good for two (or more) color blocks as the entire design can be transferred to each block that is to be cut and the colors that are not to print can be cut away. This assures good register to the key block.

3. Pasting transfer

Procedure:

a) Trace the design onto tracing paper.

b) Paste the tracing paper, face down, onto the linoleum.

c) Allow the paste to dry.

Note: If the design does not show through the tracing paper after it is pasted on the block and is dry, oil the paper.

d) Cut the block through the tracing paper.

e) Remove the excess paper from the surface of the block after it has been cut.

4. Carbon paper transfer

Procedure:

a) Trace the design onto a sheet of tracing paper.

b) Prepare the surface of the linoleum as described in item 1-b.

c) Place the carbon paper face down on the linoleum.

d) Place the tracing, face down, on the carbon paper.

e) Fasten the tracing and carbon to the block with gummed tape.

f) Trace the design through the back of the tracing.

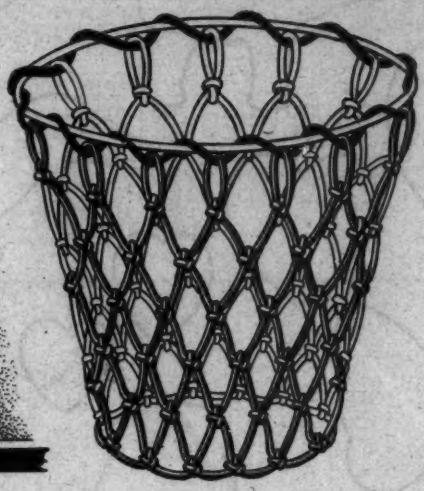
g) Remove the tracing and carbon paper. Cut the block.

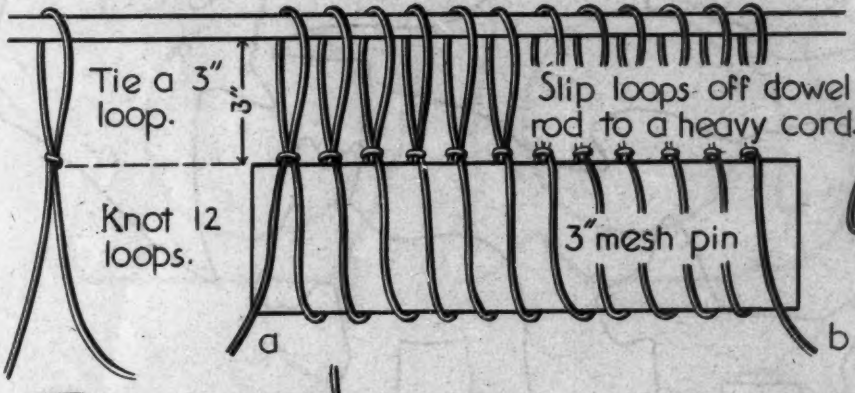
The geographic center of steel manufacturing capacity is now located at Dola, Hardin Co., Ohio. — *Steel Facts.*

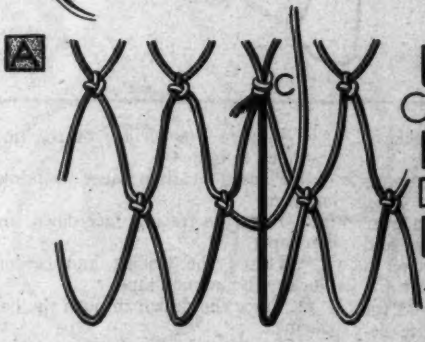
Siderurgy is the metallurgy of iron and steel. — *Steel Facts.*

July is the danger month for 5- to 24-year-olds. In 1943, over 12 per cent of the annual total of accident deaths for this age group occurred in July. — *Safety News.*

A BASKETBALL NET



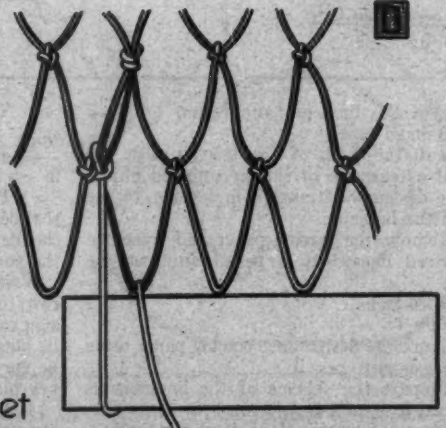


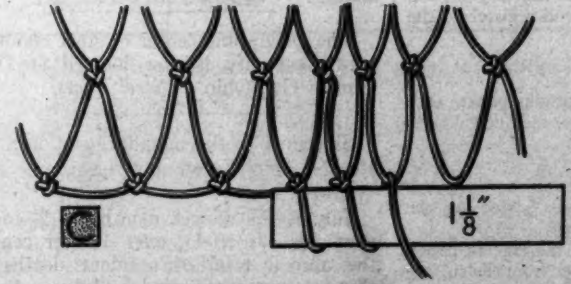


A Completing a row

B Beginning a row

C Knotting last row





Make net of lightweight rope. Knot 5 rows of loops, using a 3"mesh pin. Finish with 1 row of loops, using a $1\frac{1}{8}$" mesh pin.

Basketball net submitted by Louis V. Newkirk, director of industrial arts, Chicago, Ill.

DOES PAPER COUNT IN TYPOGRAPHIC DESIGN?

Paper must be selected for appropriateness to the design, as well as its adaptability to the production techniques and ultimate use.

1. Color. Sparing use is made of colored papers, except for small advertising pieces or announcements. Book papers are usually white or natural.

2. Relationship to type.

OLD
PAPERMAKING
BY
DARD HUNTER

Old style type tends to be rugged and vigorous. It is most effective on antique papers, especially when strongly impressed on dampened stock.

DEN NORSKE
HUSFLIDSFORENING
GJENNEM 40 ÅR
1891–1931

Modern type is uniform, mechanically accurate, and thus is better for the even "kiss" impression on even-surfaced, smooth papers.

3. Laid and wove. Laid paper, in particular, has much to do with the appearance of printed matter. The deckle edge of hand-made or certain machine-papers may be used on items that are to carry the effect of luxury, formality, or early historic correctness. Chain lines should run correctly for the book size.

4. Grain. In order to insure a flexible book, the grain should run parallel to the hinge.

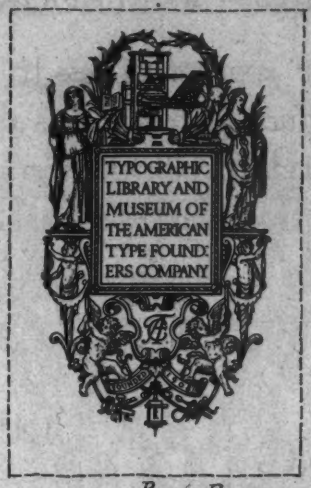
5. Texture. Antique, plate, English finish, or coated paper may best fit the requirements. The designer should have many manufacturers' samples on hand. The technical requirements of printing may be the determining factor. The elimination of glare may be important, or the problem may call for planned irregularity of surface.

6. Hand- or machine-made. Cost, quantity, surface, or impression may determine choice.

Plate 64. Design course by Burl N. Osburn, director of industrial arts, State Teachers College Millersville, Pa.

WHAT FACTORS MAKE A GOOD BOOKPLATE?

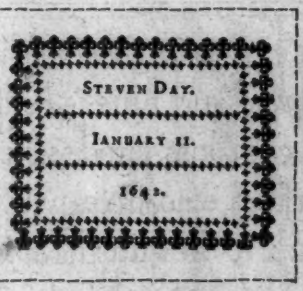
Correct details, such as heraldry



Bryce Rogers

Dignity in institutional plates

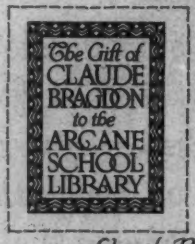
Uniqueness of design



Typographic materials used by themselves

Jaru Beran

Interesting content



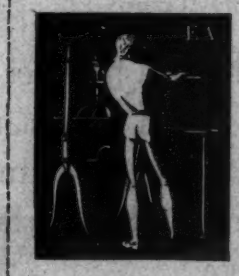
Claude Bragdon

Good lettering, in an enduring style

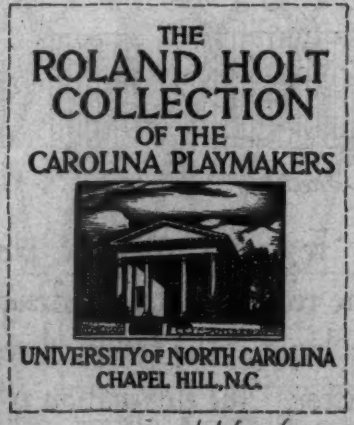
L. Roy Davies

Autographic methods of production

Rockwell Kent



Obvious symbolism



J. J. Lankes

Treatment suitable to medium employed

Plate 65. Continuation of design course by Burl N. Osburn, director of industrial arts, State Teachers College, Millersville, Pa.

GLIDER TRAINING AND ITS PLACE IN THE PUBLIC SCHOOLS

WESLEY B. HAMMOND

York Central School
Retsof, N. Y.

We hear so much about the air age lately and what it means that perhaps we should review its implications.

Before the war, aviation was just coming into its own and was rapidly becoming a very important industry. Its job potential was approaching that of the other industries and presented an opportunity for many jobs and positions.

During wartime, aviation came into its own as a major force in world affairs. An opportunity was presented to the manufacturers, operators, etc., to gain a great deal of experience and knowledge and this opportunity has been developed to its fullest extent. New and better airplanes have been developed along with better methods of manufacture.

Students in the glider construction class

The place of aviation in postwar transportation is fairly obvious. Supplies, materials, and finished products must be transported to Europe and Asia. Overseas passenger service will be necessary and will be of tremendous volume. More and more travel will be done in the United States by everyone because of the time element, comfort, and convenience. Express transportation will be done a great deal by airlines to facilitate speed in transit. Personal flying by private airplane owners, and renters will be many times greater than it is today because of the development of safe, fast, cheap, airplanes. All of this adds up to a very important industry and a great influence on the history of the world and many, many jobs for our students of today.

Education has a very definite obligation to the students primarily because of the lack of knowledge concerning aviation and the number of students who will eventually depend on aviation for their livelihood.

During the war the need for aviation education and courses became extremely evident. Trained workers were scarce for the aviation industries, preinduction training was needed, and the rapid growth of the aviation industries, along with the newspaper's educational program, presented the need for such education.

The war has sold aviation to the general public, and has speeded its general development. The school systems must meet the need, for the students of today are the aircraft mechanics, workers, pilots, navigators, etc., of tomorrow. Today, the mechanics of the automobile is being taught to many of our students yet every boy or girl has a firsthand, and intimate contact with cars. The number of youths who have had the opportunity to acquaint themselves with aircraft, in comparison, is very small, yet later in their lives all of them will be affected by aviation. The primary aim of an industrial-arts shop or of any shop course other than the strictly vocational one, is to acquaint as many students as possible with as many materials, processes, and industries as possible. Therefore, can an industry as large as aviation be disregarded in our educational system?

How can aviation best be taught in a general high school and what should its aims be? Such a course should acquaint the student with aircraft construction, maintenance and repair, flying, and related theory such as: aerodynamics or theory of flight, meteorology, navigation, and Civil Air Regulations, and should develop a certain amount of skill in shopwork and flight in order to thoroughly cover and present the subject. Its purpose should be to provide the opportunity for the student to experience a firsthand contact with the various phases of aviation in order to meet the following criteria:

a) A part of the student's liberal education
b) A basis for vocational guidance
c) A prevocational course

Some of the courses which are being taught at present are:

a) Theory (meteorology, navigation, Civil Air Regulations, airplane operation), and a few hours of flying a light plane
b) Maintenance and repair
c) Model building
d) Glider construction and flying

The question which is immediately raised is, which course of these is the most desirable? Referring to the aims and purposes of aviation educational courses and assuming them to be logical and covering the subject properly, it seems that an aviation course exposes the student to:

a) Actual construction of aircraft
b) Actual repair and maintenance
c) Theory (necessary to cover the whole picture)
d) Some flight training

If these items are included, the subject will be fairly well covered; and yet if any are missed the student will suffer.

The medium which will cover these items efficiently, and with the lowest per pupil cost is the one dealing with glider building and flying, since by building a glider, maintaining it, studying aviation theory, and flying said glider, all items are covered. In addition, such a course presents an excellent aviation, vocational and avocational guidance opportunity. The avocational aspect shouldn't be disregarded for soaring as a sport is unexcelled. This course is not an experiment, or a nebulous idea but is a practical plan which has been proved by its operation in a New York state school for the past two years. It was found that the cost compared favorably with that of the operation of other courses and in many cases was very much less expensive and in addition covered the subject very much more thoroughly. The equipment needed is already found in most general shops so the purchase of additional equipment is unnecessary.

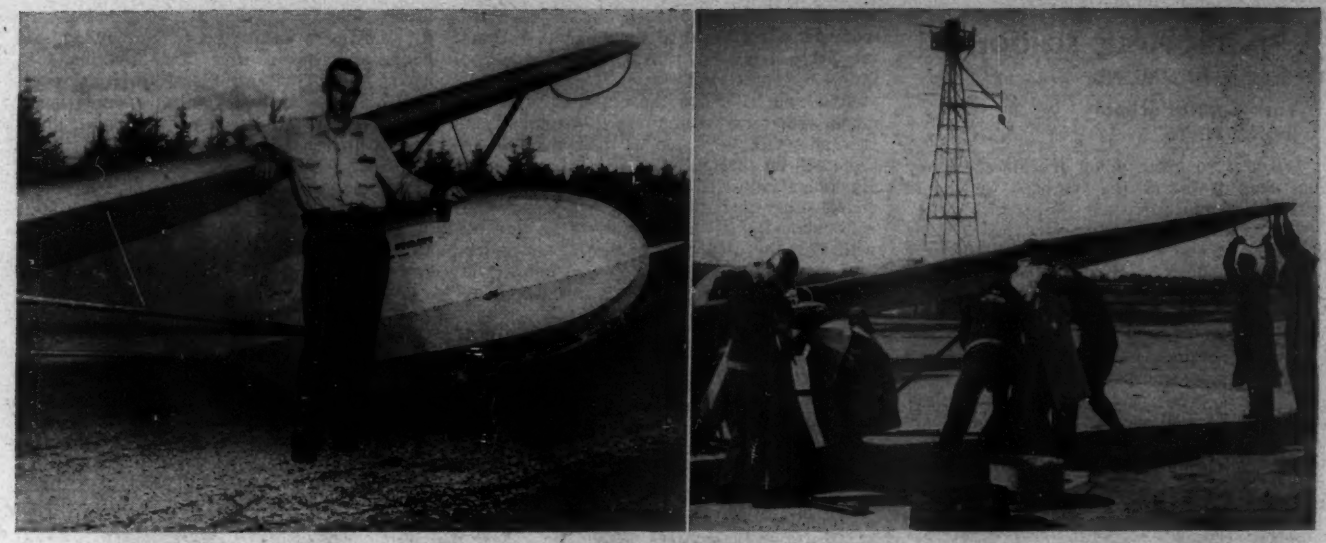
The procedure of teaching such a course is as follows:

A. Construction: The building of a single place utility type glider from a kit.

B. Related subjects: (1) Theory of flight, (2) Processes, (3) Materials, (4) Meteorology, (5) Navigation, (6) Civil Air Regulations, (7) History, (8) Nomenclature.

C. Flight instruction: Giving enough glider flight training so that the student knows something of flying and what it involves.

The building of a glider instead of working on power planes is justified in many ways. The skills of high school students as a rule do not permit extensive metalwork, particularly in aircraft welding. This discourages power plane repair work or construction, but does promote wood construction. This is justified because of the easy transition from wood to metalworking, if the student decides to continue his aircraft education. A power plane can not readily be built in a school shop and then flown, but with a glider this can very easily be done. A glider, if built from a kit, can easily be constructed in one school year, thus keeping interest and making available to each class, all the processes involved. Model building has a purpose in the schools but doesn't cover entirely, the aims and purposes in the senior high school. Once the glider has been built its cost has been justified by its instructional value, consequently, a school can afford to own and operate it as a flight training device. Most smaller schools could not afford to purchase, much less operate and maintain, a power plane.



Assembling the glider

Assuming the logic of teaching aviation with the glider as a medium; which type of glider should be built, and why? With the construction angle solely in mind it would be necessary to keep the material cost as low as possible. The number of hours required to build such a ship must be few in number. As few jigs as possible should have to be constructed because of the time required to make such jigs. All the basic aircraft construction processes should be involved up to the capabilities of the general high school student. Since it is proposed to use this glider for flight instruction, it is important that emphasis be placed on certain factors of design which will govern its flight characteristics. Since it is to be used in the public schools the safety features are of primary importance. A low flying and stalling speed is necessary and it should be difficult to spin. Good control with emphasis on an easy flying ship is a requirement. Ruggedness is also a primary consideration and should include an ability to withstand hard landings and definite pilot protection in case of a crash. All modern safety features should be incorporated such as overrun type of release, brakes, etc. It should be easy to repair and also easy to maintain. In this regard items such as: tires large enough and fittings heavy enough to prevent excessive wear so that maintenance costs will be low should be incorporated. The ability of such a glider to be operated from a fairly large, flat field or airport by automobile tow is a prime consideration in order to keep operation cost low. Pilot comfort and safety is important so this ship should have a comfortable, roomy cockpit, cushions, etc.

According to past experience and actual experimentation the single-passenger utility glider seems to be the only type of glider which meets all of the foregoing specifications. The present two-passenger ships which are available are not suitable for day after day — auto tow — airport training with high school students for several reasons. These ships are high performance types. Therefore, they fly faster than is expedient for student training. Speed is critically regulated with altitude, and the high gliding ratio leaves little room for pilot judgment error, in landing approaches. The altitude achieved by auto or winch tow isn't conducive to allowing the student to do much of the flying since he could in a few seconds' time put the ship in a very bad position. The cost is relatively high and the present two-passenger craft is difficult to build as the method of construction used in high performance sailplanes is usually not applicable to the unskilled student.

The training procedure which seems logical and which has been used in schools is as follows: The construction angle is handled by purchasing a single passenger glider kit, which saves time, allows the use of a steel tube welded fuselage (with its many advantages), eliminates the necessity for large jigs, and assures the certification of the ship upon completion. This kit consists of: the primary fuselage structure welded up, controls installed in the fuselage, fittings and struts made up, and all materials necessary for its construction furnished. The construction which must be done to build the ship from this kit is sufficient to give all the necessary training in construction yet enough preliminary work is done to facilitate its being built in one school year. The work which must be done is briefly as follows: (1) build wings; (2) build ailerons; (3) build tail surfaces; (4) build fairings; (5) install seat, instruments, etc.; (6) rig ship; (7) rig controls; and (8) cover entire ship.

This setup assures the low time element necessary yet teaches aircraft construction by teaching processes such as the following: (1) layout, (2) use of jigs, (3) aircraft gluing, (4) gusseting, (5) safetying, (6) assembly, (7) covering, (8) rigging, (9) weighing and balancing, (10) use of patterns and templates, (11) cable splicing, (12) material protection (varnishing and zinc chromating), (13) use of special aircraft tools.

This work is within the capabilities of and can be done entirely by the students with the proper supervision. The glider must be licensed for airworthiness and meet the standards of the Civil Aeronautics Administration before it can be flown and must be inspected during its construction so the question of safe construction is answered.

The flight training is handled in several ways and has several functions. Training the student in the ship he has built promotes careful workmanship and accurate craftsmanship. The primary purpose is to give the student enough flying to aid in his vocational guidance: that is, answer his question as to whether he wishes to build or fly. It also introduces gliding as a sport, provides a good basis for further training in flying, and justifiably broadens his liberal education. By training up to but not beyond, the high, straight tow stage, the element of danger is removed yet the student receives enough knowledge of flying to fulfill the aims and purposes of the course.

Where possible it is advantageous if the school could supply an instructor who might be a teacher or interested person affiliated with the school so it could own, operate, and supervise its own students and equipment. The school, if it has not a flight instructor within its system and no one who could or would be interested in becoming one, can easily hire a flight instructor to give instruction to their students either on week ends or during a short postschool year session for flying only. An intensive ten-day or two weeks' period should answer the purpose nicely. If it is too difficult for the school to obtain an instructor, or too expensive to operate its own equipment, it could affiliate with other schools in its area, together hire an instructor, pool their ships at a common airport and offer an intensive, two-week postschool year training course to their deserving students. In this way the operation cost is low, plenty of good equipment available, a capable instructor is supplied and only one field of operation is required.

Summary

The educational system is challenged by the tremendous growth of aviation in the past few years and by the potential it holds for the future. It is the responsibility of the educational system to keep pace with this development. This can only be done by offering to all students the same as any elective course in the high schools, an introduction to the wide range of problems in aviation.

Aviation education through the use of a *glider construction and flying course* without question most completely fulfills this obligation through the combination of theory, building, and flying.

ORNAMENTAL TIN CRAFT

CHRIS H. GRONEMAN
Industrial Education Department
A. & M. College of Texas
College Station, Tex.

(Continued from page 369 of the October, 1945, issue)

Bracelet

Bracelets are not difficult to make from sheet tin. This bracelet has an individuality of its own and will be a charm to any girl. Double thickness sheet tin stock provides the proper spring, yet is rigid enough to be very service-

able. The edges must be cleaned and dressed so there is no danger of sharp edges of metal. Bracelets can be ornamented by overlay, piercing, or a combination of both. The design shown in layout A has proved very popular with students. Design B offers an opportunity for intricate piercing, filing, and marking or chasing with a cold chisel. Since this is a costume bit of jewelry and will be in use regularly, the copperplated finish must be preserved with an occasional coating of clear lacquer or a nickel-plated finish. Forming must be done to fit the wearer's wrist. This can be done over a 1½-in. pipe with the aid of a fiber mallet.

BILL OF MATERIAL FOR DESIGN A

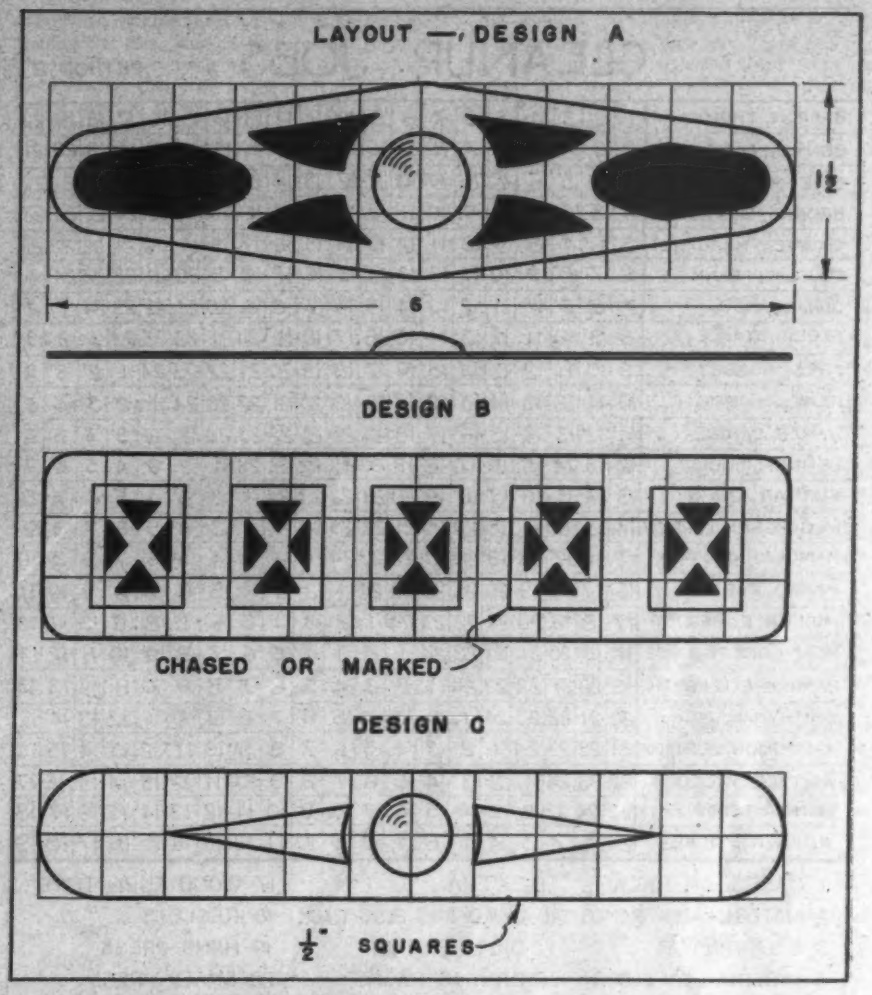
No. of pieces	*Item*	*Size*
2	Sheet tin	1¾ x 6¼ in.
1	Chair glider	¾ in.
	Solder, flux, steel wool	

Tools: Alcohol burner, asbestos sheet, brush, carbon paper, copperplating setup, emery cloth, files, flat iron, heating device, jeweler's saw frame and blade, lead or wood block, lead weight, mallet-fiber, peening hammer, pencil, 1½-in. pipe, rule, scriber, soldering copper, tempera water color paint—yellow, and tin snips.

Procedure:

1. Use design as shown in the drawing, or develop an original design.
2. Cut out 2 pieces of tin stock.
3. Solder one side of each piece.
4. Sweat both pieces together with hot flat iron.
5. Apply coat of yellow tempera water paint to one side of sweated piece for design transfer.
6. Lay design sheet and carbon paper over painted portion and trace design.
7. Drill holes and cut out with tin snips and jeweler's saw frame and blade.
8. File and dress edges with emery cloth.
9. Peen exposed surfaces on lead or wood block.
10. Remove prongs from chair glider, file edges.
11. Apply solder on edge of glider.
12. Sweat-solder glider in place with alcohol torch.
13. Form bracelet over cloth covered 1½-in. diameter pipe with the aid of fiber mallet.
14. Rub bracelet with steel wool and prepare for plating.
15. Apply thick coating of copper.
16. Polish project with steel wool. Use cloth to prevent touching metal with hands.
17. Apply coat of clear metal lacquer and allow to dry.

The U. S. Department of Agriculture estimates that out of the more than 6,500,000 farms in the country, one in each 37 had a disastrous experience with fires in the five-year period from 1936 to 1940. — *Safety News.*



DELEGATING CLEANUP WORK IN THE SCHOOL PRINT SHOP

J. ORVILLE WOOD

South High School
Pittsburgh, Pa.

One of the most important educational functions to be learned is habit formation of the right kind. The most important one to learn in a school print shop is order. There should be a place for everything and everything must be kept in its place. There are hundreds of different pieces of equipment and materials used in a shop and every one must be kept in its right place so that when anything is needed it can be found quickly. The needless hunting for certain things not only requires unnecessary time, but sooner or later causes the student to lose interest in his work. He becomes careless, and possibly begins to make trouble for himself and others. An orderly shop makes for quicker and better work and more contented pupils.

In order to bring about orderly conditions, the cleanup job described herewith was devised. Every pupil of each class has a definite task each day to perform during the last few minutes of the period. Each week it is a different kind of work; and during the semester all pupils have handled the particular tasks at least once, and in some instances twice. Thus, through the entire course all have had training in caring for the various types of machines and equipment.

On the cleanup schedule form, shown in Figure 1, the names of the pupils are written for each period of the day. With the key at the bottom of the sheet any pupil may note what he has to do each week.

Cases on Racks. Every pupil using a case of type taken from a cabinet is presumed to return it again when he is finished with it, or at the end of the period. However, some forget, so the No. 2 boy sees that all cases are put away in their proper places.

Material on Frames. This means that no leads, slugs, type, galleys, or furniture are left lying on the case stands or cabinets.

Distributors. They are the only persons who work at this cleanup task for the entire class period. They sort out and put away the type that was picked up from the floor, or left lying on the racks. Many odds and ends of various sizes and kinds are thus handled. In matching the type with the sample sheets of the office catalog of type faces the names and location of the type are learned. The more advanced students distribute the regular run of jobs that have been printed.

Material on Floor. Everyone is cautioned to pick up any type dropped on the floor. But some forget, and the No. 4 boys goes around and picks up any scattered type and places it on the desk for the distributors the next period. Thus no type is swept out by the cleaners.

Extra. The two extras do the work of any pupil who is absent for the day. There are two people assigned for *extra* duties, but the key numbers are different for both of them. Thus a boy as extra one week will not fall in that

CLEANUP JOBS — PERIOD 2

BARRON, THOMAS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
BENYON, DOROTHY	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
BOLE, NORMAN	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
BROOKS, HARRY	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CAWLEY, MARGARET	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
DOUGLAS, FRANK	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	1
DURAN, ANDY	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	1	2
FEDER, STANLEY	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	1	2	3
FRYE, ROBERT	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	1	2	3	4
HENK, THOMAS	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	1	2	3	4	5
JAMES, DANIEL	11	12	13	14	15	16	17	18	19	20	21	22	23	24	1	2	3	4	5	6
LEHNER, LOUIS	12	13	14	15	16	17	18	19	20	21	22	23	24	1	2	3	4	5	6	7
KURHAN, JOHN	13	14	15	16	17	18	19	20	21	22	23	24	1	2	3	4	5	6	7	8
McSWIGGEN, LORRAINE	14	15	16	17	18	19	20	21	22	23	24	1	2	3	4	5	6	7	8	9
MAMULA, DOROTHY	15	16	17	18	19	20	21	22	23	24	1	2	3	4	5	6	7	8	9	10
MARKO, MARTIN	16	17	18	19	20	21	22	23	24	1	2	3	4	5	6	7	8	9	10	11
MILLER, ELMER	17	18	19	20	21	22	23	24	1	2	3	4	5	6	7	8	9	10	11	12
MONTGOMERY, BRYCE	18	19	20	21	22	23	24	1	2	3	4	5	6	7	8	9	10	11	12	13
PARRISH, ELIZABETH	19	20	21	22	23	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SMITHYMAN, JACK	20	21	22	23	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
THOMPSON, GERTRUDE	21	22	23	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
WALLACE, WILLIAM	22	23	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
WENDT, TEDDY	23	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
WINOWICH, RUBY	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

1 CASES ON RACKS	9 EXTRA	17 WOOD FURNITURE
2 MATERIAL ON FRAMES	10 LEAD AND SLUG RACK	18 REGLETS
3 DISTRIBUTOR	11 DISTRIBUTOR	19 HAND PRESS
4 MATERIAL ON FLOOR	12 DRYING RACK	20 SMALL PRESS
5 EXTRA	13 METAL FURNITURE	21 LARGE PRESS
6 LEAD	14 STICKS	22 PROOF PRESS
7 GALLEYS	15 STONES	23 INK KNIVES
8 LINE GAUGES	16 TABLE	24 RAGS

Fig. 1. Rotating the cleanup jobs

category again until some few weeks later.

Lead and Slug Rack. These boys see that the lead and slug rack is in good order before the end of the period by straightening up the messed condition left after two dozen students have fished for various lengths.

Galleys. Any empty galley is gathered up and stored with others at a certain place, so that whenever anyone needs one he may know where to find it.

Line Gauges. A dozen line gauges are used around the shop every period, and somebody is forgetful and leaves one out of place. They have to be gathered up and put in a little drawer under the imposing stone.

Drying Rack. The top of this cabinet is to be cleared of any odd material out of place that someone may have carelessly left there. Of course, if it is known who left some odd material there he is told to take care of it himself.

Metal Furniture. The one in charge of this material sees that all lengths and widths of the two cases are arranged correctly and in ascending order from the smallest to the largest.

Sticks. There are a certain number of composing sticks placed out for use, enough for every person of the largest class to have one. There are three different styles. The person whose duty it is to check this part of the equipment sees that they are all returned to the place where kept. He also must determine if any part of a stick, such as a knee, thumbscrew, or clamp, is missing.

Stones. The imposing stones must be cleared of all material used in locking up jobs, such as a chase, quoins, furniture, reglets, loose type, etc., and placed where it belongs.

Table. The large table used for folding, and other bindery work, is put in order, nothing to remain that does not belong there.

Wood Furniture. We have two different cabinets for wood furniture, one under each stone. One is cut in lengths of multiples of six picas, while the other is in multiples of five picas. These must not be mixed. Lengths and widths should be placed in their right compartments.

Reglets. These thin strips of wood come in two thicknesses—nonpareil (6 pt.) and pica (12 pt.) and in lengths from 10 picas to 60 picas, graduated by picas. They must be kept in order, both as to their thickness and length, so that when the lockup man reaches for a certain length or kind he gets what he wants. The boy assigned to this work every week must see that the reglet cabinet is kept in good order.

Hand Press. Three 7 by 10 hand presses are in use most of the time to print name cards and other small jobs. They must be washed thoroughly at the end of the day, and at the end of a period if a colored ink has been used. Generally the boy, or girl, using a press either washes it up himself or assists the one assigned to the work.

Small Press. This is the hand-fed, motor-driven, 8 by 10, C. and P. Gordon press. If a job has not been finished at the end of a period naturally the press is not washed. So that is a break for some boy. However, a change of color may be necessary during the period and the one assigned to this press for the week is called upon to do the washup.

Large Press. This is the 10 by 15 C. and P. Gordon press. The same procedure applies as for the small press. The printing of the school paper is one job that requires the use of the ink fountain. When it is used the extra work of taking it apart and cleaning it falls to the boy assigned to this press for the week.

Proof Press. The brayer and ink slab of the proof press need be washed only at the end of the day, unless a quick-drying job black has carelessly been used sometime during the day and it has dried so that further proofs cannot be obtained.

Ink Knives. These are to be cleaned thoroughly. Then when colored ink is used, or a tint is mixed, there is no need to worry about a trace of black smearing in. A part of the work of this assignment is to see that the cans of ink are covered and put in the cabinet.

Rags. All wiping rags around the presses or stones are gathered and kept in the fireproof receptacle provided for this purpose. The very dirtiest ones are carried out and disposed of at once.

It is surprising the interest taken by the printing pupils in this schedule. They enter into the various tasks with enthusiasm and no arguments are voiced as to their doing too much of any one thing or of doing any one thing too often. Many take the initiative, and on Mondays find out what they have to do during the week toward cleaning up the shop, and never have to be reminded of their duties. There are some, of course, who have to be reminded occasionally, but even these acquire good habits if the instructor keeps after them consistently.

THE FILM-STENCIL METHOD

J. I. BIEGELEISEN

New York School of Industrial Art

New York City

You who have heard of silk-screen printing as a simple craft may be confused by the unexpected ramifications of so simple a process. This is the third article in the series, each one of which deals with an individual stencil-making method. Silk-screen stencils can be made in half a dozen different ways. The fact of the matter is that these different approaches make silk screen one of the most unique and flexible printing processes known. In order to appreciate the entire scope and possibilities, one should explore all the accepted methods, see what each has to offer, and discover how each can best meet the requirements of the job on hand and the conditions under which you work.

Teachers and professionals, too, who know

all the methods, most often select the film method as a means of reproducing posters, charts, and other printed matter where precision and sharpness of line are essential. Assuming that you are already equipped with a standard screen unit, there are a few other things you will need in order to make a film stencil. These items can be procured from large art supply stores or firms that specialize in silk-screen materials.

NuFilm. This consists of a thin sheet of transparent lacquer tissue laminated to a sheet of glassine paper. This is the material from which the stencil is cut.

Stylus. This is a small-bladed knife used to cut the stencil film.

Adhering thinner. This is a lacquer solvent used to soften the stencil film and cause it to adhere to the silk.

Removing thinner. This is a more potent type of lacquer solvent. It is used to dissolve the film from the silk when the stencil is no longer needed.

Fill-in lacquer. This is a quick-drying lacquer used to block out the marginal area of the silk surrounding the sheet of film.

Here's how to go about making a stencil by the film method.

1. Cut off a sheet of NuFilm stencil paper slightly larger than the size of the area you wish to print. See Figure 1.*

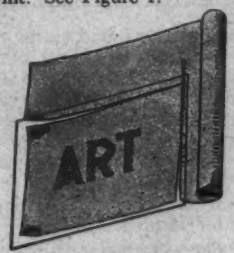


Fig. 1. Cutting the film to size

2. Fasten the film securely to the original with scotch tape or thumbtacks, as shown in Figure 2. Be sure that the lacquer (shiny) side of the film faces up; the glassine (dull) side down.

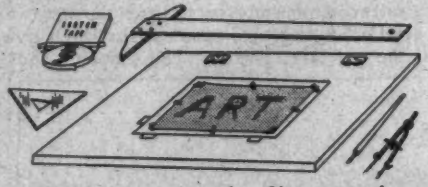


Fig. 2. Fastening the film over the original and setting it in guides

3. With a No. 2 Grumbacher or an X-Acto stencil knife cut a tracing of the design, as shown in Figure 3. Exert light pressure on the knife so that the blade will cut the lacquer skin without piercing the glassine backing sheet of the film.

4. After this trace cutting is completed, lift and pull out the cut parts, leaving the backing sheet exposed in those areas as shown in Figure 4.

5. Examine your work thoroughly to make certain that the stripping is complete in all the areas to be printed.

6. Place the original, with the film still attached to it, into the registry guides on the printing base.

7. Now remove most of the tacks or tape holding the film, leaving just enough to keep the film from shifting out of position during the operation that is to follow.

8. Lower the screen so that the silk is in firm and even contact with the film.

9. Saturate a soft rag with adhering fluid (also called lacquer thinner) and rub it quickly and vigorously over the silk, as shown in Figure 5. This lacquer solvent, seeping through the silk, softens the lacquer of the film and makes it adhere to the silk. Caution: If used too freely, this fluid will dissolve the film completely, so use a wad of dry absorbent cloth or wool rag to dry the silk thoroughly immediately after applying the thinner.

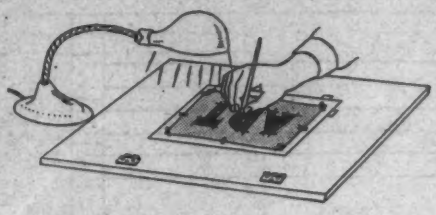


Fig. 3. Trace-cutting the design

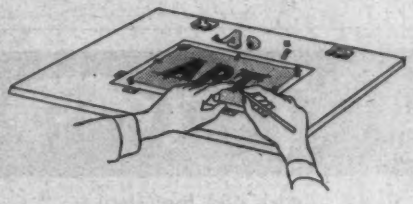


Fig. 4. Stripping the film

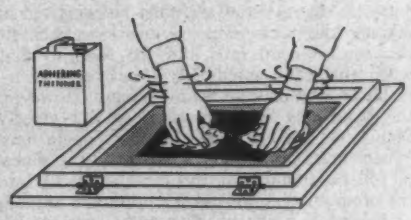


Fig. 5. Adhering the stencil

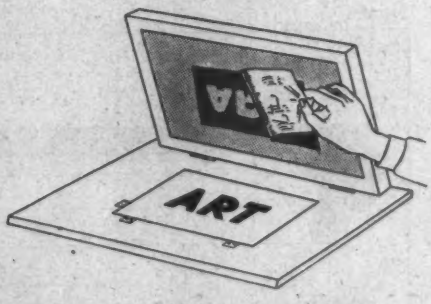


Fig. 6. Stripping the backing sheet

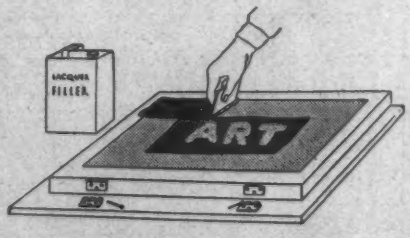


Fig. 7. Stopping out the areas surrounding the stencil

10. Allow a few minutes to dry.

11. Lift the screen carefully. You will find that the film has disattached itself from the original and is now transferred to the silk. See Figure 6.

12. We are now ready to remove the backing sheet and open the stencil. Starting at one corner of the film, stick your fingernail or the blade of the stencil knife in between the backing sheet and the lacquer tissue. Now with a good grip in the one corner, pull away the entire backing sheet. See Figure 6. Note: Only the lacquer film has been affected by the thinner and adhered to the screen. The backing sheet has not been affected and will come off readily. With the peeling off of the backing sheet, the silk is *open* in parts so that the paint can pass through freely. The film which remains adhered to the screen acts as a frisket impervious to paint, and represents the "closed" parts of the screen.

13. The film stencil is now ready for printing.

Film stencils have remarkable durability. They will yield thousands of perfect prints without showing any signs of wear. At the end of a *run*, when any remaining paint has been scooped up and the silk has been properly cleaned, the stencil may be left intact on the screen for re-use at some future date. A film stencil will not deteriorate no matter how long it is kept in storage. Of course, where it is desired, the stencil may be dissolved immediately after use, by washing the screen with film remover. When the screen is cleared of the film, the same silk can be used for other stencils.

Editor's Note: If you would like to see what can be done with hand-cut film stencils, the author has a limited number of copies of a silk-screened print 6 by 9-in. printed in eight colors, which he will send free of charge to anyone requesting a copy and enclosing sufficient postage to cover mailing. His address is J. I. Biegeleisen, 1725 Morris Ave., New York 57, N. Y.

*All illustrations used in this article are from *Silk Screen Stenciling as a Fine Art* by J. I. Biegeleisen, published by McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 18, N. Y.

WALL-SHELF TOWEL RACK

ISADORE M. FENN

Chicago Vocational School

Chicago, Ill.

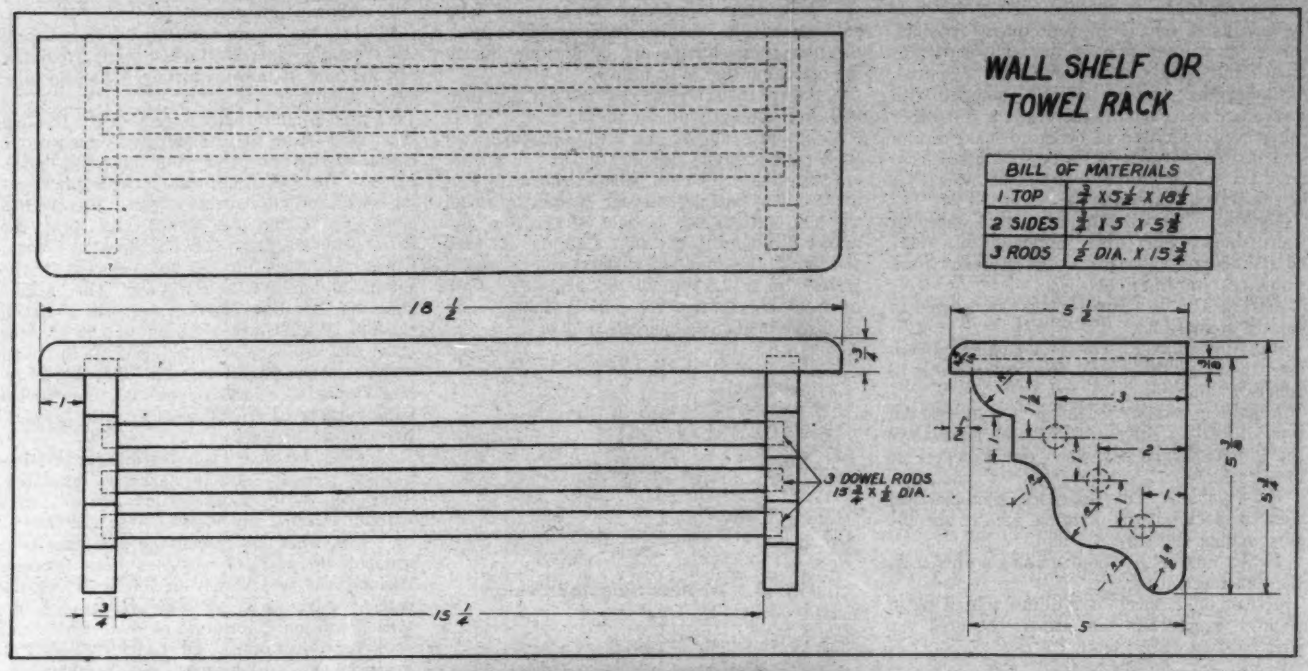
Here is another worth-while project for the home, shop, or office, which needs very little motivation. This unique combination wall shelf is very simple to construct, takes very little material, and yet offers a variety of experiences.

Construction Procedure:

1. Read blueprint
2. Obtain necessary stock
3. True up edge and end of both sides
4. Make layout of sides according to drawing
5. Cut out design and shape with chisel and gouge
6. Bore holes in the sides for the dowels
7. True up material for the top and round the edges
8. Lay out and cut dados in the top
9. Cut three dowel rods to size
10. Sandpaper all the parts, assemble with glue, and finish as desired.

Experiences:

Blueprint reading, obtaining material, planning, planing, squaring, layout, measuring, jig sawing, marking, gouging, hand sawing, chiseling, gouging, boring, sanding, assembling, gluing, and finishing.

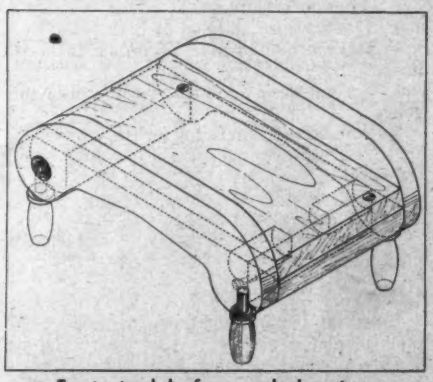


ANTIQUE FOOT STOOL AND UTILITY BENCH

DON L. DETWILER,
LLOYD B. KEHLER, and
P. W. MEMMERT

Bethlehem Technical High School
Bethlehem, Pa.

The *utility bench* described herein is a type of bench, as the name implies, that has many uses. It may be made from any kind of lumber suitable to the conditions under which it is to be used either as a piece of fine furniture or as a household article. The outstanding features of this bench are: (1) the high safety factor, and (2) the rugged construction of the joints. Too often many of the benches have a tendency to tilt very easily when the load on the seat is shifted. This may easily happen while sitting or standing on a bench and is a hazard both to the young and old alike. This factor of tilting readily has been overcome by constructing the legs so that the angle of slant is 10 degrees. This angle must be maintained in the side rails also. The type of joint used, *the lock joint*, has added a great deal of strength to the bench. The joint will save hardware and add extra life to its use. Care must be exercised in making the lock joint to insure a tight fit between the end rails and the ends so that when glued and assembled it will be rigid.



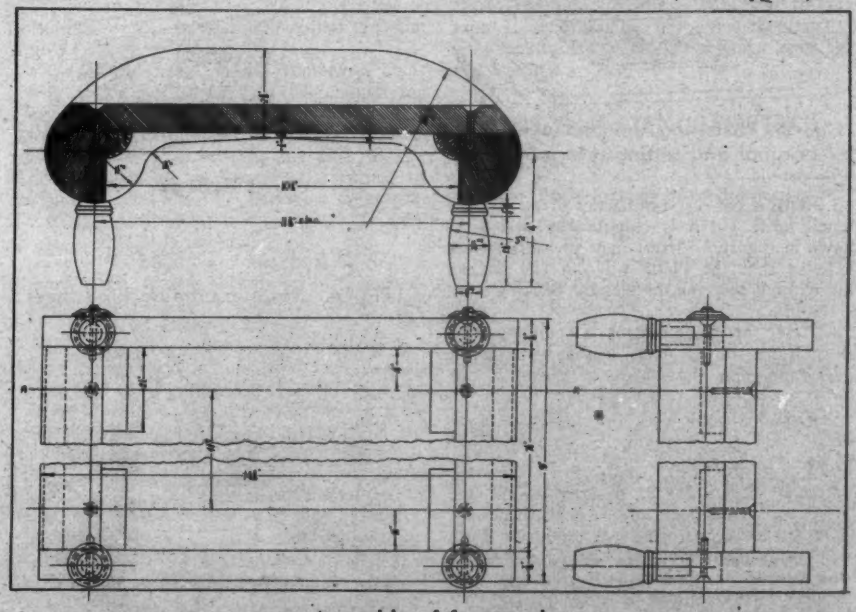
Foot stool before upholstering

Bench and foot stool

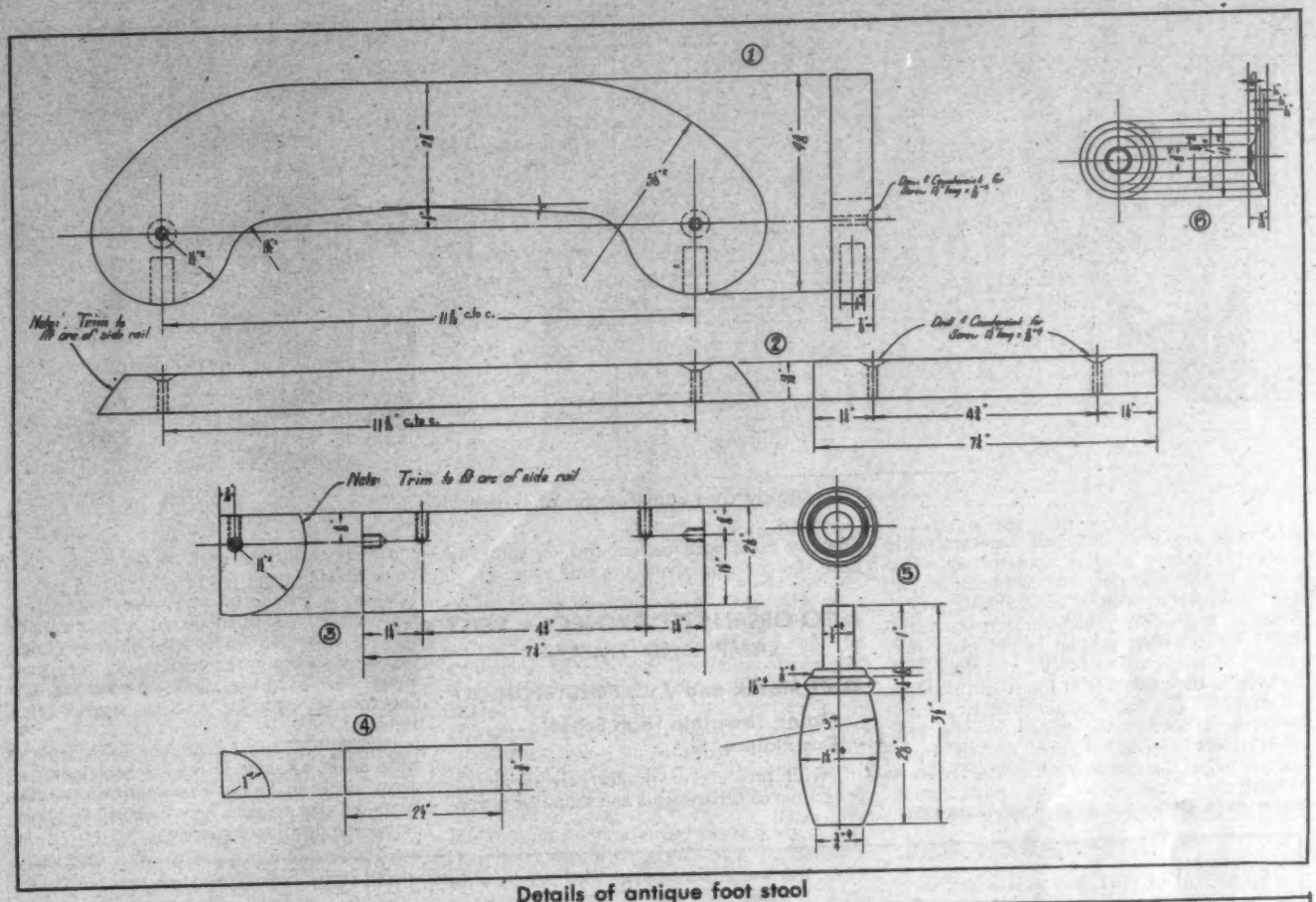
This bench may be made by hand. However, the band saw and circular saw will greatly facilitate the various shaping operations. Where mass production is taught in the shops, it will be found that this bench will fit into the program very well with a minimum amount of materials involved. The small construction blocks are glued to the ends and sides to allow the seat to be fastened securely with screws.

This bench will be found useful as an extra seat for a child in a car, at a camp, or for many uses about the home. The top may be upholstered and covered which will be an added asset when the better grades of wood, such as mahogany or walnut, are used. The finish may be in the natural wood, stained and varnished, or painted. If a better grade of wood is used, the finish and wearing qualities will be better insured.

The *antique foot stool* with its simple construction and unique design is certainly a welcome addition to the collection of the better furniture. Very few board feet of lumber are required in its construction. The side rails and four legs can be made of a hardwood, such as walnut, maple, or mahogany, which will give the desired antique effect to the finished product. The seat, and support blocks and the construction blocks can be made of a softwood, remembering to shape the first two mentioned pieces to conform to the curve of the end rails. The seat, end supports, and

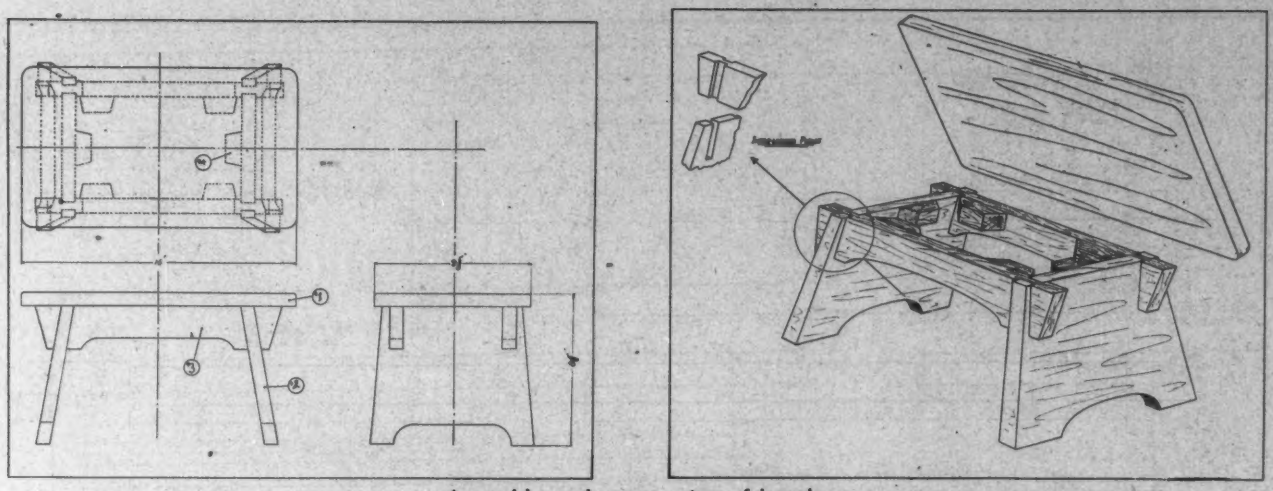


Assembly of foot stool



Details of antique foot stool

Details of small utility bench



Assembly and construction of bench

side rails are then fastened together with screws to insure a rigid construction. The screws in the side rails are countersunk and are then covered with a small rosette which is nailed in position to hide the screws and to add a bit of ornamentation to the plain side rails. The construction blocks are glued and screwed to the underside of the stool to add to its strength. The finish of the foot stool may be in the natural wood, stained or varnished, or antiqued to give the effect desired. Upon completion of the finishing operation, the stool is ready to be upholstered either with a small piece of tapestry or needle point covering, properly filled with cotton, tow, or moss, to raise the covering above the side rails.

A CO-ORDINATED PROJECT — POST LAMP AND EMBLEM

KURT MEYER and J. C. PENDLETON

Maine Township High School
Des Plaines, Ill.

Useful projects or products requiring co-ordination of departments and shops are always in demand.

The typically old post or lawn lamp finds favor when brought to life in a modern setting. It incorporates the training values essential to well-rounded, sound, industrial or practical-arts training on a high school level, such as design, woodwork, metalwork, ornamental iron, sheet metal, electric wiring, glasswork, drafting, layout, turning, soldering, riveting, sign lettering, and the like.

Figures 1, 2, and 3 represent an example of what might be done by high school industrial departments in family characterizations. The lamp and sign emblem were designed and layed out in the drafting department.

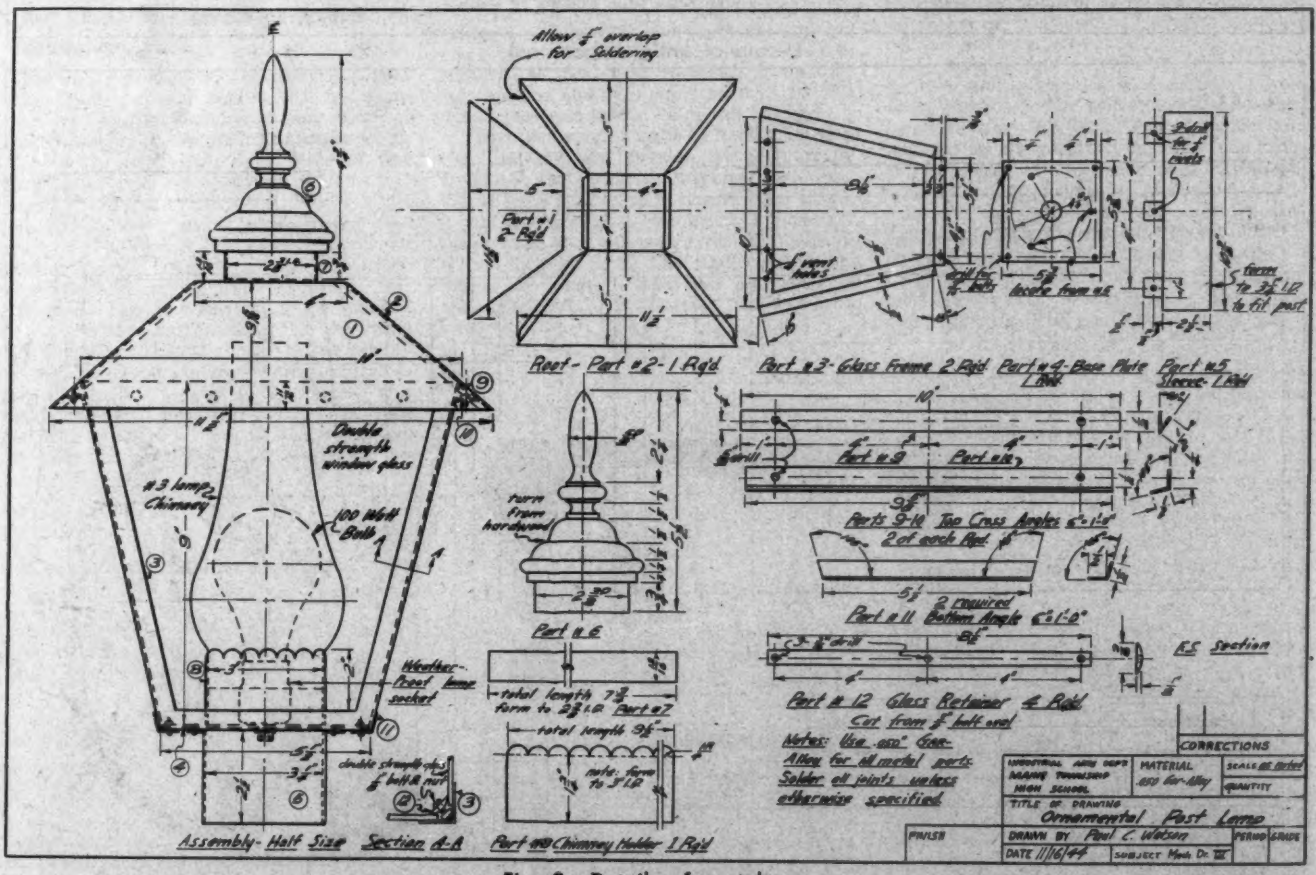


Fig. 2. Details of post lamp

Fig. 1. The post lamp

The lamp was made of sheet gar-alloy under supervision of the electrical department, while the emblem and ornamental ironwork was done in the metal and machine shop. The post was grooved, glued, and dressed in the woodworking department. The lettering was done in the sign department and the photographs taken by the photography department.

A LETTER TO THE NEW SHOP INSTRUCTOR

GERALD T. MARRON

Assistant Director, Vocational Division
High School
Stamford, Conn.

The expert mechanic or tradesman entering the field of vocational education is confronted with many problems hitherto unknown to him and grave enough to seriously hamper his attempts to teach the trade which he thoroughly understands and has spent many years working at. This is particularly true of the machine tool trade as taught in vocational high schools. School administrators realizing these problems make many attempts to orientate the tradesman through the process of *teacher training and preparation*. Knowledge embalmed in textbooks is retailed to him to the extent of several hundred clock hours' credit, he receives a certificate, and then is tossed to the wolves, so to speak. He enters his shop or classroom on that fatal-first day armed to the teeth with prepared curriculum most of it embellished with a high grade mark if he has been conscientious, and has pleased his professor at the teacher-training institution. The new instructor soon finds out for himself that in self-protection he has to develop procedures for assigning work, care of equipment, lubrication, cleanup periods, and many other things most important of which is proper tool crib procedure. The success or failure of an instructor depends upon his own individual ability to eliminate these problems. Assuming that a tradesman has selected vocational instructing as a career, he will accept these problems as a challenge and attempt to attain organizational perfection in his shop as a sure means of increasing the quality of his product, which is the learner.

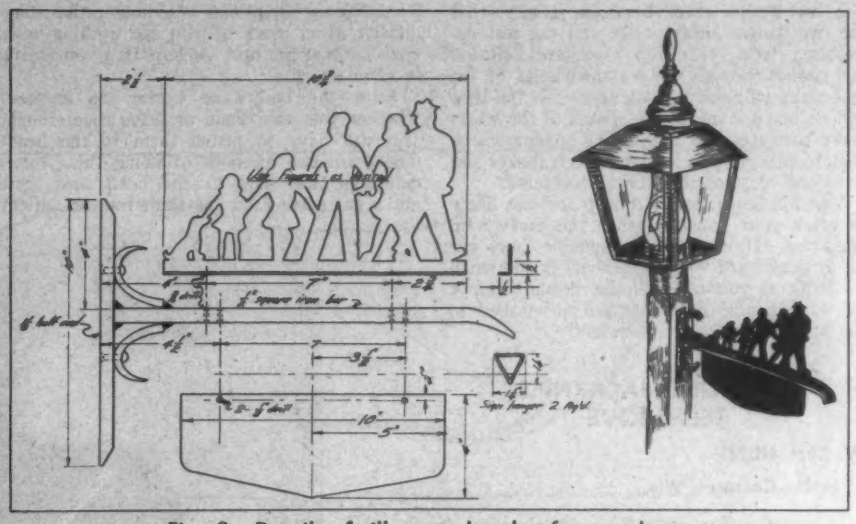


Fig. 3. Details of silhouette bracket for post lamp

The process of eliminating shop problems is a heart-rending proposition. Ideas will be thought up that seem to be foolproof and yet when they are put into practice, they collapse in short order. The writer has experienced all of the aforementioned problems and realizes from many years of actual shop instructing that a new teacher can continue blindly for years, trying and changing methods before a semblance of perfection is reached. It is with this thought in mind, to aid the new instructor, that the writer attempts to offer his solution to what he believes to be the greatest shop problem—the tool crib. Very few, if any, vocational high schools, have a paid or permanent crib tender. It, therefore, falls upon the instructor in charge to assign boys to this work. The period of assignment cannot be too long since it will detract from their acquisition of manipulation learning, and it cannot be too short or they will be valueless as tool tenders. Personal experience has proved that different learners assigned on alternate weeks work out adequately for the following system.

This whole system of procedure is based on the assumption that each boy assigned to the crib knows absolutely nothing about the tools nor what they look like. The walls of the room are lettered alphabetically in sections, shelves and drawers are numbered, and a small index file consisting of cards approximately 4 by 5 in. is acquired. The first step is a complete inventory of everything the crib contains. After this the name of each tool is typed as a heading on an individual 4 by 5-in. card along with its location, such as section 5—shelf 1, or drawer 1, etc. A picture replica of each tool is glued to the proper index card. These pictures are obtained from catalogs and trade magazines. The reverse side of the index card is reserved for the purpose or use of that particular tool.

Now let us try our system. Bill has been assigned to care for the crib. He knows nothing about the tools but the instructor has explained the filing system to him in a few minutes. Meantime the instructor has returned to his learners and during a discussion of John's job the instructor explains that he should use a countersink. John approaches the tool crib and informs Bill of his needs. Bill consults his index file under *C*, looks at the card, sees a picture of the tool, learns its location, and procures it for John who returns to his work station. After he has left, Bill is curious and consults the back of the card to find out what the tool is used for. The crib tender's knowledge has been increased, the instructor has not had to be called from his learners to show Bill the tool, and John has not had to make several trips back and forth.

This system has further value not only as a perpetual inventory but can be of great aid as a reminder to the instructor in the purchase of expendable supplies such as abrasive paper and cloth, tool bits, etc.

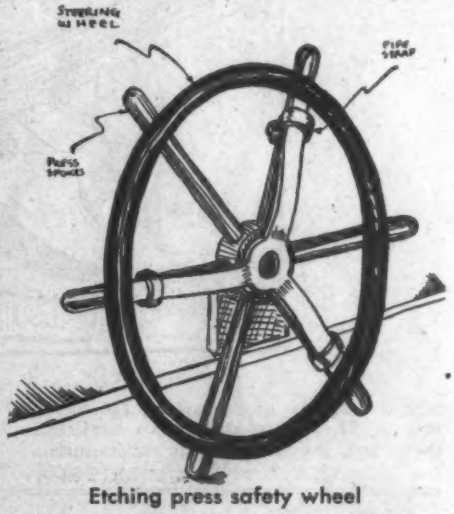
ETCHING PRESS SAFETY DEVICE

SIMON S. PALESTRANT

William Howard Taft High School
Bronx, N. Y.

The five steel bars that radiate from the hub of the etching press axle are a constant worry in the classroom. During operation youngsters often spin with such rapidity that distances become difficult to gauge and cracked knuckles and jaws frequently result. There is also the great temptation to spin it about just as soon as looking at it. These revolving arms can cause a wicked welt or even greater damage to anyone who inadvertently meets with the spinning tentacles.

To obviate such hazards, lash a large steering wheel (truck size) to the arms by means of a



Etching press safety wheel

1-in. metal pipe strap. Bend the strap so that the two flanges almost meet and the rest describes a circle. A 3/16-in. roundhead bolt and nut passed through the matched holes of the pipe strap will clamp it tightly, while the loop will encompass one of the spokes of the wheel and a corresponding arm of the etching wheel. Match and clamp at least two such spokes and arms and see that the wheel is centered.

You will find it easier to grip and less likely to crack your knuckles when the press is in operation. If the wheel obtainable (any car lot or junk yard will have them) is too small in diameter you can still use it and remove all those handle rods that are not lashed to the wheel.

WHITTLING-JACKKNIFE TECHNIQUE

W. BEN. HUNT

Hales Corners, Wis.

(Continued from page 374 of the October, 1945, issue)

Bull Moose

The bull moose shown in Figure 187 offers a real challenge to those who really like to whittle. The body itself is not so difficult if you have chosen a nice piece of wood. Regarding direction of grain, you have a choice. Working in mahogany (the original shown in Figure 187 was whittled out of mahogany), if the grain runs horizontally, the cutting will be easier on the body proper. The legs in this case are cross grained. If the grain runs up and down the legs are easier to whittle, while the body presents more work. The real test comes when the antlers are tackled. They are rather tricky no matter how you go about them. In making the model, two methods were tried out and while both antlers turned out nicely we are showing the simplest method. At *A* in Figure 188 is shown the block used. Cut out the template at *B*, reversing it to draw the two antlers as shown at *A*. Then with a band saw or jig saw cut out the silhouette. Then shape the concave surface as shown at *C* and after that the convex surface. Rounding up the prongs is tedious rather than difficult in as much as you are working with cross grain at the tips. Be sure that your knife is razor sharp.

After the body and horns are finished, whether you sand them or leave them rough, you will have to fasten them to the head. There are two methods of doing this. First, determine the slant at the head, and then cut a flat surface on the skull for the antlers to rest on. Then cut *round* tenons on the bottom butt of the antlers, as shown in Figure 188 at *D*, and cut a *round* mortise for it to fit into. We say round because after the cement has been applied and the horns set in place, you may have to twist them a bit to get them even. Using airplane cement or DuPont household cement it will be just a few minutes before the cement sets and then the job can be set aside for overnight drying.

The other method of fastening is with pegs, as shown at *E*. This requires that the flat surfaces on the skull be cut first. Then the butts of the antlers must be cut to fit. Now you will need four hands, or a helper, since the horns must be held in place while the hole is drilled through the base of the horn into the skull. Use a 1/16-in. drill. Then whittle two slightly tapered dowels long enough to project about ¼ in. After the fitting with the dowels is satisfactory, remove the dowels and put a drop of cement on each one and set it into the base of the antler. Then put more cement on the bottom and in the mortise and press the horns in position. If the dowels fit perfectly, set the job aside until the cement is dry.

Fig. 187. The bull moose

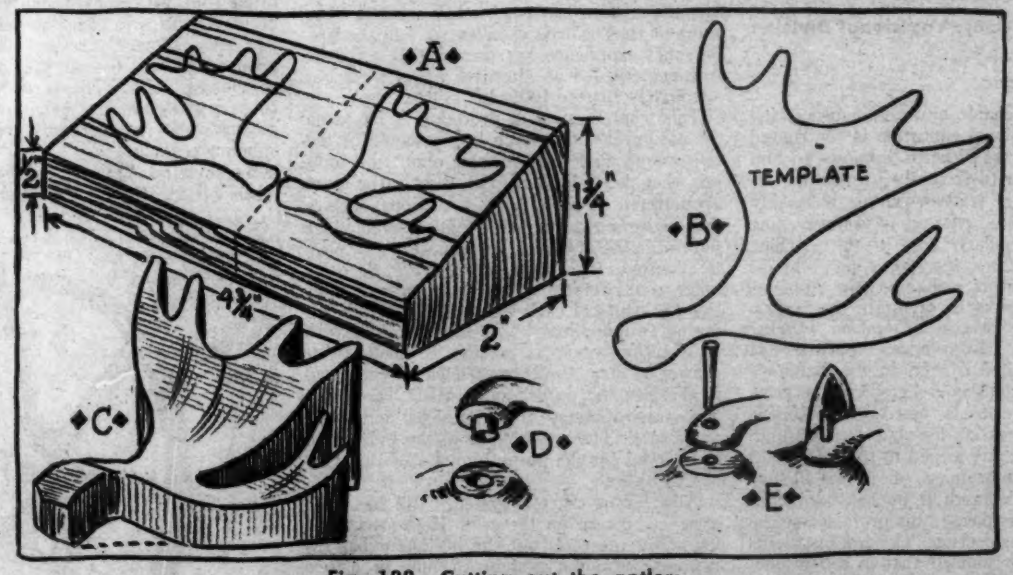


Fig. 188. Cutting out the antlers

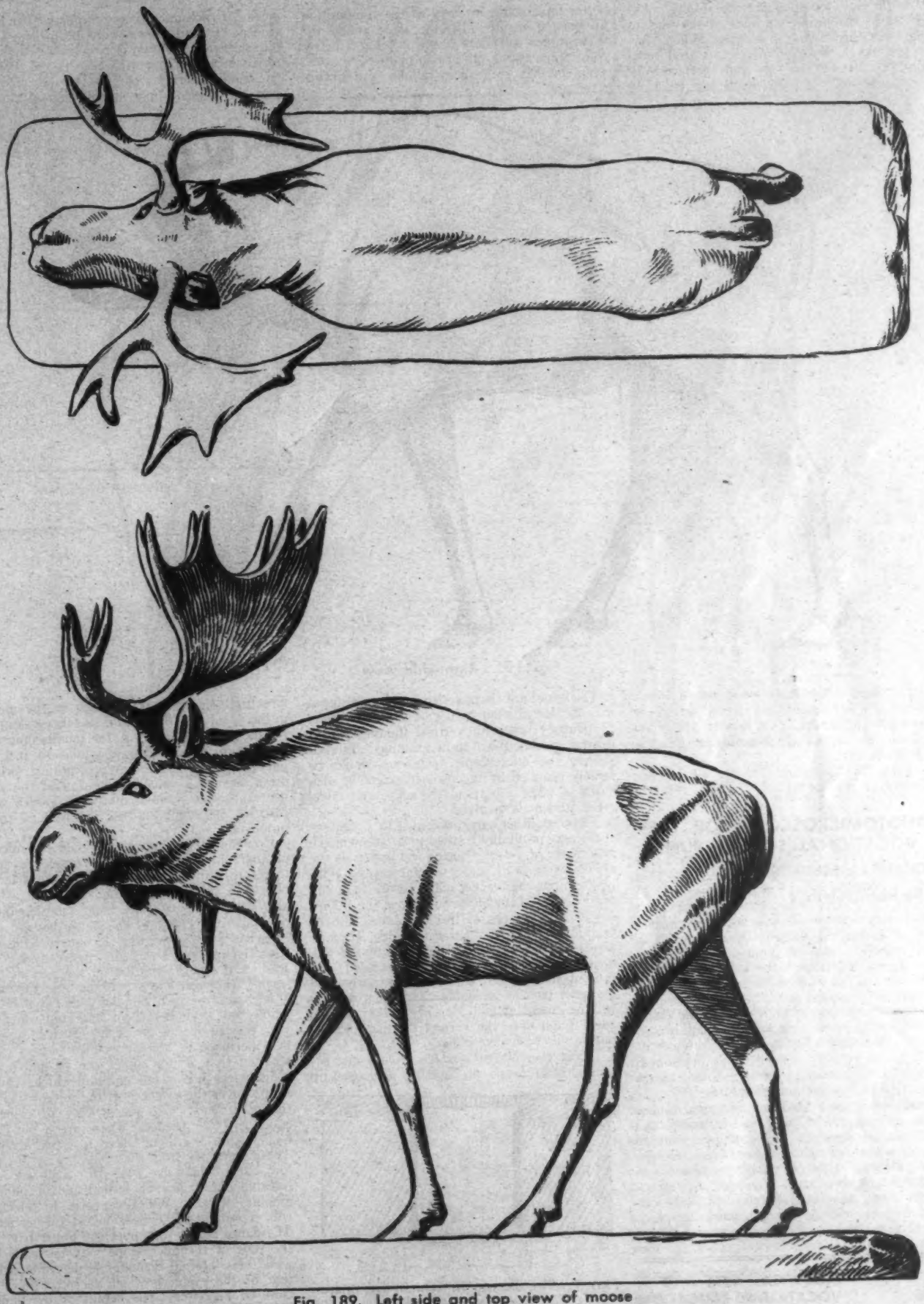


Fig. 189. Left side and top view of moose

If the fit isn't too snug, tie the antlers, making use of the projecting ends of the pins to keep the thread from slipping. When dry, cut off the projecting dowels and sand carefully. If the antlers do not fit perfectly fill up the openings with fine wood dust made by filing a piece of the same wood out of which the moose was whittled, and after filling up the opening with cement, dust it with the wood dust and let dry. A little trimming and sanding will do the rest.

Figures 189, 190, and 191 are all full-size patterns of the moose.

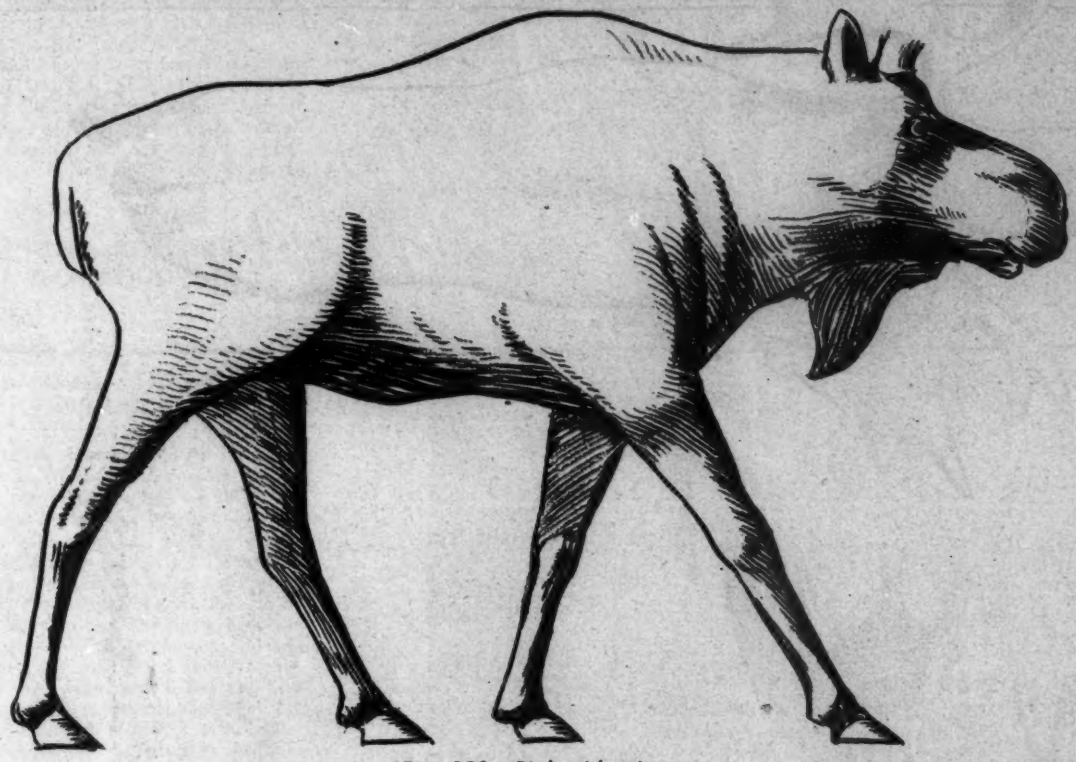


Fig. 190. Right-side view

PHOTOMICROSCOPY FOR THE VOCATIONAL SCIENCE PUPIL

RICHARD H. BEHRENS

Berkeley, Calif.

It is generally conceded, in vocational education, that the best related science teaching is achieved by giving the pupil direct and controlled experiences with the materials of construction and the tools of his trade. In practice it is realized that the limited time available for his formal training demands concise and easily understood teaching situations and that his ability to rationalize scientific theory in terms of shop processes is usually not highly developed.

The related science teacher should, therefore, be focally conscious of the need for presenting basic and fundamental science phenomena in terms of trade and industrial applications. It is not difficult to understand that the metalworker may gain a better fundamental understanding of the physical characteristics of metal if he knows that it is crystalline in structure. If he can actually see the crystals he can better understand the changes which take place in the metals he hardens or softens and he can better understand the *why* of the composition of bearing metals. By the same token the woodworker can more easily develop a better conception of the physical properties of wood when he has seen their cellular and fibrous structure.

The structural characteristics of any material may be best studied by use of the microscope, particularly one with vertical illumination, if opaque specimens are to be examined. In such studies the microscopic technique would be largely supplied by the teacher except in such cases as when a particularly adept and interested student is involved.

Pictures, either as paper prints or as lantern slides may profitably be used to supplement the experience of actually seeing the materials the student works with under the microscope. With photographs the teacher may prepare the pupil for what he should look for under the microscope. Photographs of specimens may also be used as a basis of further study and discussion after the microscope has been used by the student. Such pictures may be exposed and printed, from time to time, as particularly good examples become available. Such photography will be found simple for the teacher or the adept pupil once the correct lighting and exposure has been determined.

Direct co-ordination of the science instruction with shopwork can be easily developed by means of such microscopic projects. The shop student can with considerable profit bring into the science laboratory examples of the materials he is working with. Where gas or electric welding forms a part of the shop instruction the student may learn much about the structural changes taking place in the metal in the vicinity of the weld if he takes a sample, polishes it, and etches it for microscopic examination. Where it is possible to include photography in the microscopic project, prints often become a valued possession of the student and often serve as motivation which well justifies the slight expense involved in their production.

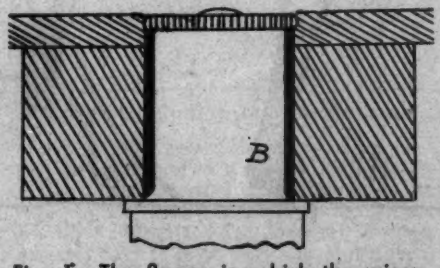


Fig. 1. The flange in which the microscope tube is held

Commercial equipment designed for microphotography is usually quite expensive and, therefore, cannot be included in the science budget of the average secondary school. It is also fairly intricate in design and requires manipulative skills and knowledge beyond the capacity of the average secondary student. Such equipment also calls for considerable study and experimentation on the part of the teacher who wishes to master photomicroscopy.

A camera of such simplicity that it may be readily made in the school shop and which is very easy to operate is needed. Such a camera may be made of a light wooden box so constructed that a film holder can be laid upon a light-tight seal at one end and which can be slipped over the eyepiece of the microscope at the other end. Two pieces only of camera equipment are needed. These are a cut-film holder and a ground glass focusing screen. These may vary from the small 2¼ by 3¼-in. film size to the 4 by 5-in. size. Such are obtainable either new or secondhand at photographic dealers. Whichever size is selected will determine the dimensions of the camera. The flange which slips over the upper part of the tube of the microscope may be made of wood. Its internal diameter is determined by that of the eyepiece which in some cases is close to 1-1/16-in. The details of the flange construction and its position with relation to

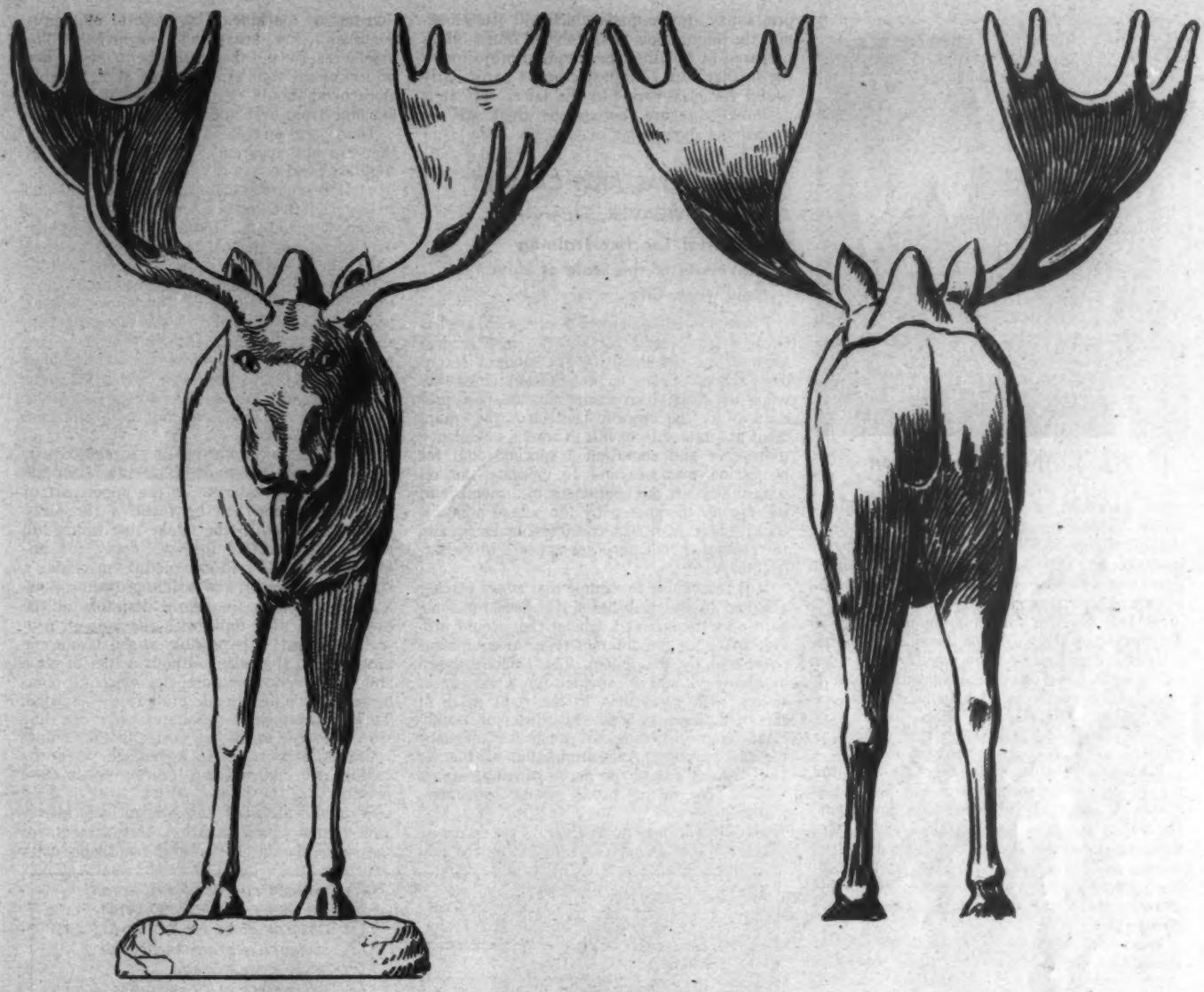


Fig. 191. Front and rear views of moose

the microscope is shown in Figure 1. The collar shown as a black area surrounding the microscope tube (B) is used to take all the play out of the fit of the camera box over the tube. This may be made by wrapping sufficient stiff paper about the portion of the tube in contact with the flange to take out any looseness. The paper tube so formed may be stiffened by dipping in shellac. The distance between the eyepiece and the film holder, which will determine the length of the camera, may be determined by focusing a slide in the microscope on the glass focusing screen held temporarily on a ring of a chemical laboratory ring stand. This may be raised and lowered at will and the image of the slide focused on the screen by means of the milled-head screw on the microscope. When the correct size has been secured this distance may be measured and the distance from the eyepiece to the focusing screen used to determine the length of the camera box.

The camera box itself may be made of light wood. The light seal at (A) in Figure 2, upon which the cut film holder and the focusing screen may be laid, may be made by gluing a ¼-in. piece of black velvet ribbon to the wood. It is desirable to paint the inside of the camera box a dead black to cut down possible light reflections. A paint made of shellac mixed with lampblack will serve.

In order to take a picture, the camera may be fastened to the microscope by slipping the collar over the upper tube, dropping the camera over this, and inserting the eyepiece. The ground glass focusing screen is then laid on the black velvet light seal, the illuminating light turned on, and the image projected by the optical system of the microscope brought into sharp focus by means of the adjusting screws. This may be facilitated by use of a darkened room or by the use of the photographer's dark cloth draped over the head and the camera to exclude most of the extraneous light. Once set, the illuminating light may be turned off and the ground glass focusing screen removed and replaced with a cut-film holder loaded with film. The slide of the holder may be removed and the exposure made by turning the illuminating light on and off. The time of exposure depends upon the film used, the nature of the object under consideration, and the power of the illuminating light. A fairly accurate idea of the time required for an average exposure would have to be determined by trial and error. Once established the brightness of the image can be judged and subsequent exposure time more easily determined. Care should always be

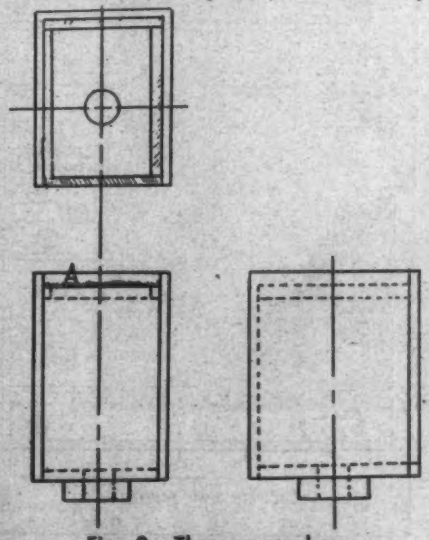


Fig. 2. The camera box

Fig. 3. The focusing screen

taken to avoid vibration during the photography. Since the camera is fastened directly to the microscope it will tend to vibrate with the microscope. This avoids the blurring sometimes met with when the camera and the microscope are separate units.

Suitable film for microphotographs may be determined by the nature of the subject photographed. Usually fine-grain panchromatic film will give the best service since with this film many photographic filters may be used to obtain special contrasts in the film. Filters may be easily adjusted by placing them over the eyepiece at the bottom of the camera.

While good results may be obtained by the use of ordinary panchromatic film developed in any of the many recommended developers, the use of one or a combination of filters, developing processes, and exposure timing often results in the production of excellent microphotographs. A study of the photographic manuals and literature will indicate the many possibilities.

When the negative is finished the use of glossy printing paper, which may be squeegeed to a brilliant finish, is desirable. Enlarged prints may also be made which will often magnify the microscopic image several times. Slides prepared to fit either the standard projector or the smaller 2 by 2-in. projector are particularly useful for classwork. In the latter case it is desirable to secure photographs which will not exceed the dimensions of this size slide.

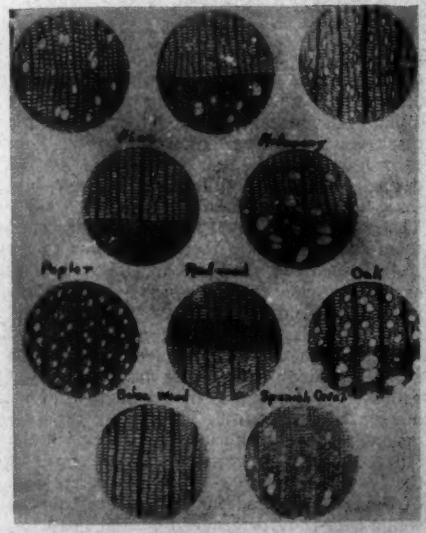


Fig. 4. Micrographs of wood specimens

A VISUAL AIDS CABINET

GILBERT G. WEAVER, Supervisor
Industrial Teacher Training
University of the State of New York
New York City

Projection equipment of a varied nature has become an integral part of the instructional facilities of practically every modern secondary school. There is no question about the value of visual instruction but the best procedures for the use and control of the equipment are in a state of flux. There is a tendency to reserve and condition a special room for projection purposes and to delegate the responsibility for the equipment to a member of the faculty designated by the school administrator. This plan has considerable merit and for general school purposes appears to be satisfactory.

It is reasonable to assume that every teacher assigned to this task has felt a need for some kind of self-contained cabinet that would provide space for the different types of equipment purchased by the school. The cabinet shown in Figures 1 and 2 provides for a variety of things, with everything in the right place at the right time. It has been in use for a sufficient length of time to prove its adequacy for the purpose. An examination of Figures 1, 2, 3, and 4, and the accompanying legends will be convincing proof of its convenient features.

It did not seem advisable or necessary to provide space within the cabinet for the motion picture machine. This piece of apparatus is usually too heavy and inconvenient to handle readily and therefore a permanent place on top of the cabinet seems logical. A suitable cloth hood should be provided to protect the machine from dust and injury.

There are several features of the cabinet that are not apparent from an inspection of Figures 3 and 4.

a) It is on rollers and may be easily moved to any desirable location. A door stop has been placed at a convenient point that enables the user to anchor the cabinet wherever desired.

b) The drawers (6) and (7) are provided with grooved partitions to permit the filing of the 3¼ by 4-in. and 2 by 2-in. slides, respectively. In the front end of the top 2 by 2-in. slide drawer (7) will be found a 2 by 6-in. box, with a frosted glass cover. Two flashlight batteries are placed in the box with a flashlight bulb and a push button. This provision permits the operator to view each slide before placing it in the projector.

c) In the lower right hand corner outside section D will be found the receptacle for the feed line to the cabinet. In the upper part of the same section will be found a three-way outlet connected to the intake line which will enable the operator to have ready for immediate use the motion picture machine, a strip film projector, and a slide projector. Such a combination is frequently desirable in the presentation of a topic with the modern projection media. It is possible to shift from one projector to the other without a loss of time and convenience because the electrical connections have been made prior to the showing. This arrangement necessitates only one line from the wall or service outlet to the cabinet which is a considerable advantage when the cabinet is being used in a location not in close proximity to the service outlet.

A modification of this design will satisfy almost any school situation. Adjustments of the space should be made in accordance with

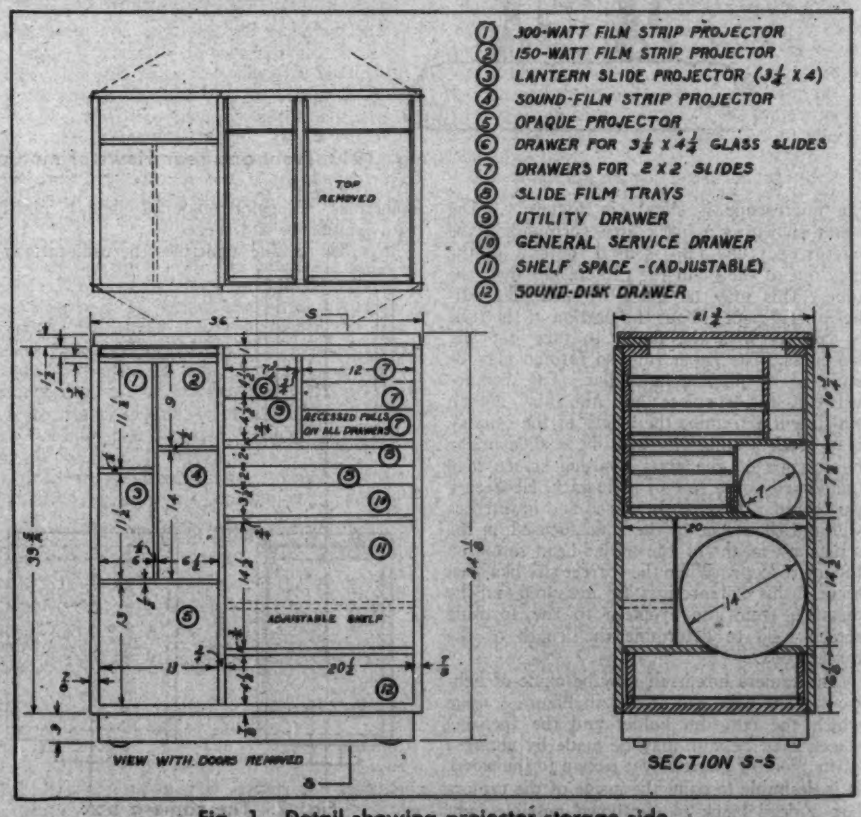

1 300-WATT FILM STRIP PROJECTOR
2 150-WATT FILM STRIP PROJECTOR
3 LANTERN SLIDE PROJECTOR (3¼ X 4)
4 SOUND-FILM STRIP PROJECTOR
5 OPAQUE PROJECTOR
6 DRAWER FOR 3¼ X 4¼ GLASS SLIDES
7 DRAWERS FOR 2 X 2 SLIDES
8 SLIDE FILM TRAYS
9 UTILITY DRAWER
10 GENERAL SERVICE DRAWER
11 SHELF SPACE - (ADJUSTABLE)
12 SOUND-DISK DRAWER
TOP REMOVED
RECESSED PULLS ON ALL DRAWERS
ADJUSTABLE SHELF
VIEW WITH DOORS REMOVED
SECTION S-S

Fig. 1. Detail showing projector storage side

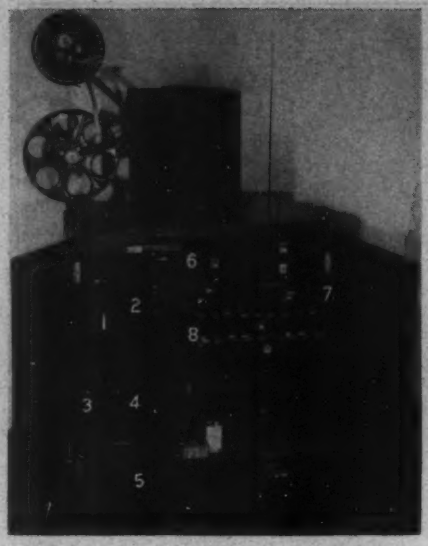


Fig. 3. The projector storage space

1. S.V.E. 150W film strip projector
2. S.V.E. 300W film strip projector
3. Lantern slide projector 3¼ by 4 in.
4. Sound strip film projector
5. Opaque projector
6. Drawer for 3¼ by 4-in. slides
7. Drawer for 2 by 2-in. slides
8. Slide film trays

the projection equipment to be stored. Provision for the motion picture machine could be made also without changing the basic design of the cabinet. The majority of school woodworking shops will find this cabinet a worthwhile project as it is within the ability of the students and the range of school shop equipment. The convenience of use and protection given to the equipment more than justify the expense involved in the construction of such a cabinet.

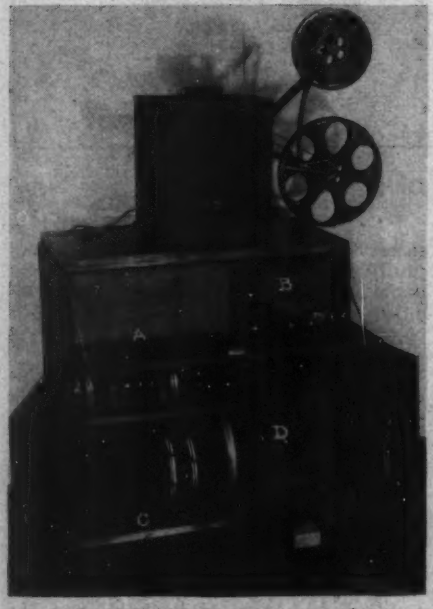


Fig. 4. Film storage space

A. Storage space
B. Repair kit
C. Motion picture can storage
D. Storage — extension cable — etc.

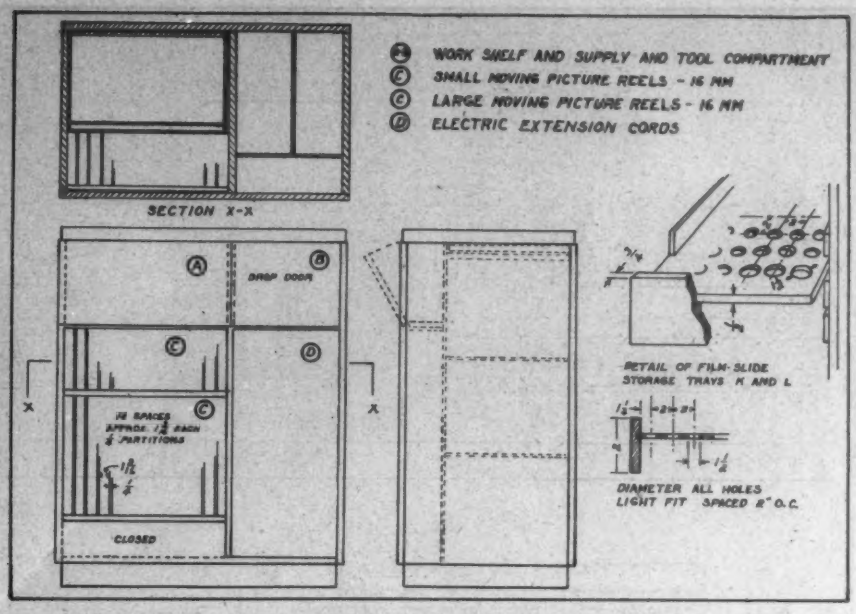

WORK SHELF AND SUPPLY AND TOOL COMPARTMENT
SMALL MOVING PICTURE REELS - 16 MM
LARGE MOVING PICTURE REELS - 16 MM
ELECTRIC EXTENSION CORDS
SECTION X-X
DROP DOOR
CLOSED
DETAIL OF FILM-SLIDE STORAGE TRAYS K AND L
DIAMETER ALL HOLES LIGHT FIT SPACED 2" O.C.

Fig. 2. Detail showing film storage side

THE HONOR ROLL

A. M. YOUNGQUIST

Morrison R. Waite High School
Toledo, Ohio

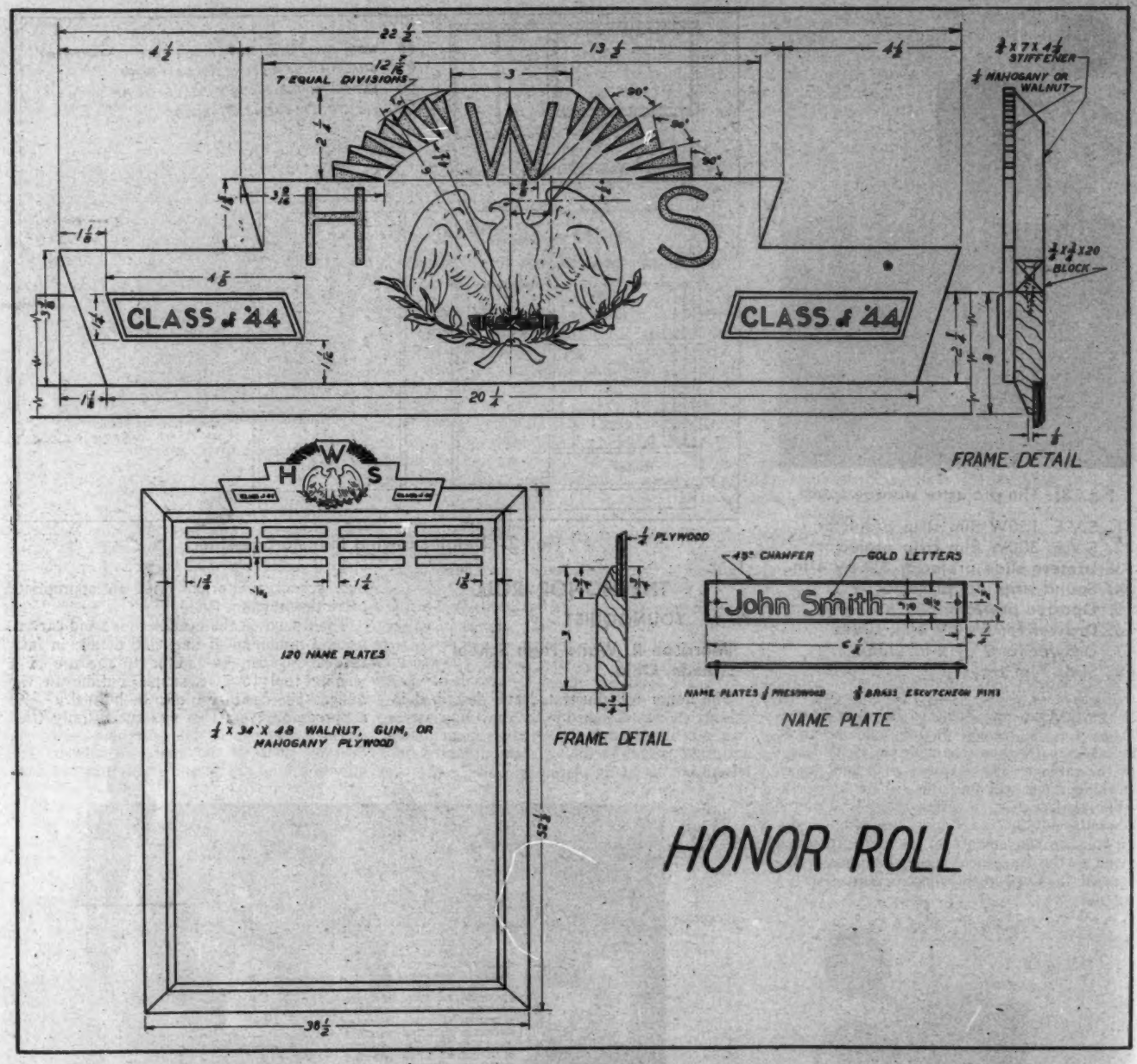
The honor roll illustrated and described in this article was designed in the drafting classes. It was constructed in the woodworking classes, and the students in the art classes painted the letters on the name plates.

The design on the headpiece is hand carved, using a minimum of lines and detail; in fact, the carving can be limited to the use of a veining tool to give simple outline to the design. The design can also be burned in with a pyrography set. This was successfully tried on one of the panels. The headpiece design can be very plain or as ornate as desired. The outline of the design and the letters are done

The honor roll at Morrison R. Waite High School, Toledo, Ohio

Four panels or frames were made to take the names of over 400 former students of the school who are now in service. Over thirty of them have made the supreme sacrifice. The first panel completed was formally dedicated in the high school auditorium with an appropriate patriotic program.

with pale gold lining bronze; therefore, the wood background should be stained a dark



Honor roll designed by A. M. Youngquist, Toledo, Ohio

walnut for contrast. The chamfered edges of the name plates are also done in gold. Aluminum paint could be substituted for the gold.

The illustration shows the materials used and the details of construction. Students are definitely interested in this type of project at the present time, and an honor roll has more meaning to students when it represents their own efforts in planning and execution.

Although the United States constructed the world's largest and most powerful navy during the war in Europe, the amount of steel needed to build the fighting ships was only a little more than half the tonnage required to build the nation's merchant fleet. — *Steel Facts.*

Pay as little attention to discouragement as possible. Plough ahead as a steamer does, rough or smooth—rain or shine. To carry your cargo and make your port is the point.

—*Maltbie Babcock*

A person is injured in a home accident every six and one-half seconds. That means that injuries from home accidents total more than 13,000 every day in the year. — *Safety News.*

NEWEL POST LAMP

H. F. ANDERSEN and WILLIAM A. DE VETTE
Technical High School
Erie, Pa.

The usefulness of a project after its completion does not justify its place in the school shop. Neither does its pleasing appearance justify its use. But, when a project is both useful and pleasing in appearance, and, in addition to this, embodies many of the principles to be taught, such a project deserves a wide usage.

A project of this type is the newel post lamp shown herewith. It combines utility and pleasing appearance, besides incorporating all three types of pattern layouts. Finally, it serves as an excellent project in the sheet-metal shop in making butt joints, soldering, and the like.

The lamp, when made of 16-oz. copper, hammered, makes a very fine appearing project.

No dimensions are given as it seems best that each student should supply his own. The switch may be of any type available and is easily fitted. The electric lamp is not shown but is placed in a receptacle set on the spacer indicated in the detail sketch at the left of the drawing on page 432.

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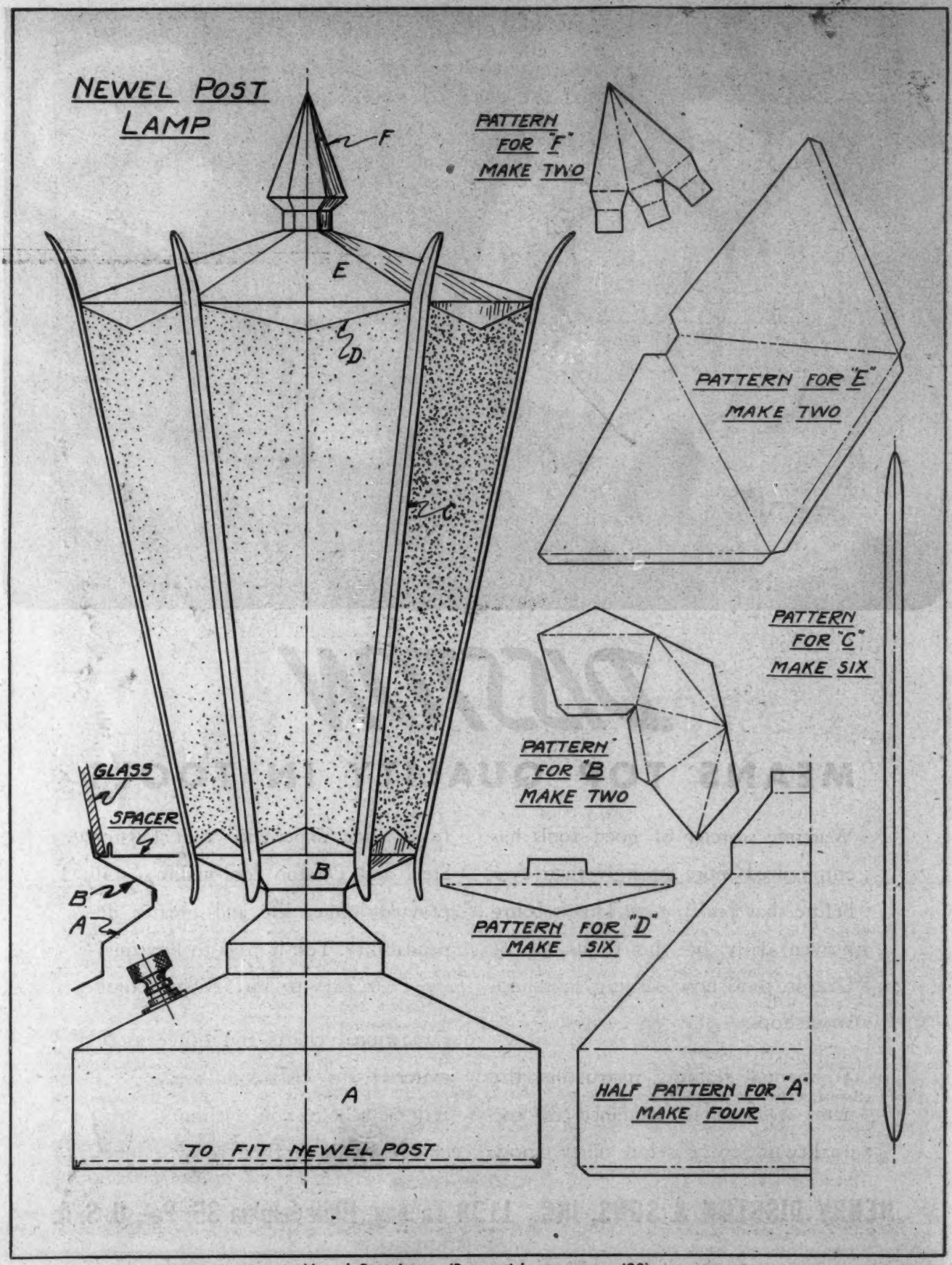

Newel Post Lamp (See article on page 430)

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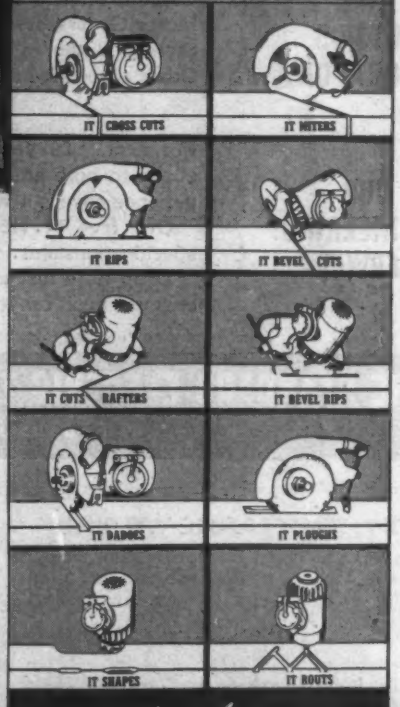

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Founded 1884

LOW TEMPERATURE WELDING

This article describes three metal joining processes, the last of which is the more recently developed low temperature welding.

Soft Solders

Available in every hardware store or "Five and Ten Cent Store" are soft solders. These are the alloys applied below 750° F. which simply adhere to the surface of the parent metal. They may be used on ferrous and nonferrous metals.

Soft solders are predominantly combinations of lead and tin in varying proportions, although for certain applications small additions of antimony, cadmium, or silver may be added to obtain particular properties.

When preparing to solder, the parts to be joined must be thoroughly cleaned and degreased and then fluxed. The fluxes for soft solders are of two general types. There are mild fluxes, such as rosin and stearine, which are applied before heating to prevent the formation of oxides on the base metals. Then there are scavenger fluxes, such as zinc chloride, zinc ammonium chloride, and orthophosphoric acid, which will actually clean oxidized or tarnished metal surfaces. These fluxes, however, should be completely removed from the work after soldering as they are quite corrosive, and may damage the finished assembly.

The heat for soft soldering may be applied with a soldering copper, by dipping the parts to be joined in molten solder, or by sweating, which is usually accomplished by means of a blowtorch, acetylene and air torch, or oxy-acetylene torch.

Soft solders are always used for sealing lap joints which are generally not intended to develop particularly great strength.

Brazing

Brazing may be defined as the joining without fusion, of various metals in similar or dissimilar combinations by means of a nonferrous alloy filler material. In other words, brazing is similar to soft soldering, except that the temperature range for brazing runs from 1200 to 2000 deg. F. The bonding action of a brazed joint is again essentially a sweating operation in which the molten brazing alloy flows between lapped or butted surfaces which have been heated slightly above the melting point of the brazing alloy. When brazing, almost all joints are lap joints, as the brazing alloys are not designed to have much strength in themselves. In fact, the clearances between the parts must be held to approximately .0015 in. in order to obtain a joint of maximum strength.

Preparations for brazing are quite similar to those for soldering, in that the parts must be cleaned and degreased, then fluxed and assembled. The temperature at which brazing is done is so high that some type of torch, an oven, or high frequency induction units must be used to apply the heat.

There are in general two types of brazing. The most commonly used is the high melting brass type brazing alloys and the second type is the low melting silver solders or silver brazing alloys. The brass alloys have melting points between 1600 to 1800 deg. F. and are generally made of copper and zinc. Another type of brazing which requires still higher temperatures is copper brazing which is done in controlled atmosphere furnaces.

Bronze welding is a variation of the use of brazing alloys in beveled butt joints or as the filler materials for fillet welds. The strength of such joints is determined by the bond of the brazing alloy to the base metal and the strength of the brazing alloy itself.

Silver soldering, is performed very similarly to brazing with brass alloys except that the temperatures required are generally lower, ranging from 1200 to 1600 deg. F. In general, silver solders are alloys composed of various proportions of silver, copper, and zinc. They are applied as described before and will generally develop the strength of the base metals being joined, if the proper clearances and amount of overlap are used. Silver solder should not be used for square-butted joints.

Low Temperature Welding

Research done by the Eutectic Welding Alloys Co., 40 Worth St., New York 13, N. Y., resulted in the discovery of a new process of welding known as Eutectic *Low Temperature* Welding, which makes full use of the phenomenon of surface alloying. Welding alloys have been developed for each application on all commonly used metals.

Studies were first made to determine the affinity of various metals for each other. Then filler rods were created, which, besides containing components of the metal or alloy they were designed to weld, contained those metals which had a particularly strong affinity for the metals in the parts being joined. In short, a eutectic alloy film is formed on the surface of the base metal where the welded metal is applied so that a bond between the weld metal and the base metal can be obtained without melting the base metal. In many cases the base metal may be 400 to 1000 deg. F. below the melting point of the weld metal.

(Continued on page 24A)

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Precision Tools... Dial Indicators... Ground Flat Stock... Hacksaws... Metal Cutting Band Saws... Steel Tapes

(Continued on page 22A)

This new type of welding rod can be classified in two groups — one: the *thin-flowing* group which first flows through capillary action and then alloys itself with the surface of the parent metal. This type is used mostly for joining sheet, tubings, and shapes. The second group is the *bead-forming* type which is applied similarly to fusion welding and is used generally for welding of castings, metals of poor conductivity and for parts which cannot be heated broadly.

The first type is used for butt and lap joints without a chamfer. A tensile strength as high as 140,000 to 160,000 psi can be obtained with a clearance of .002 in. It is important to remember, however, that with a larger clearance of .030 in. the tensile strength is still as high as 80,000 to 90,000 psi. The bead forming type gives very satisfactory tensile strength values on steel as high as 75,000 psi in a 90 deg. *V*.

This new process is generally done with the oxyacetylene flame. The *thin-flowing* type, which has a lower melting point, can be applied with gas flames, in furnaces or with induction heating. The *bead-forming* type and in general the *low temperature* alloys melting above 1200 deg. can all be applied with atomic hydrogen or with carbon arc, which would be advantageous when the heated area must be reduced to a minimum. There are eight types available for metallic arc applications for welding cast iron, malleable, alloy steel, bronze, copper, aluminum, and hard overlays.

(To be continued)

When driving your auto, watch your speed, your tire pressure, and your brakes, your steering mechanism, and your lights.

Personal News

DR. VERNE C. FRYKLUND, PRESIDENT OF STOUT INSTITUTE

Dr. Verne C. Fryklund, or rather Lt. Col. Fryklund, for he is at present on terminal leave from military service, has been appointed president of The Stout Institute, Menomonie, Wis. He succeeds Burton E. Nelson who resigned June 25, 1945.

Col. Fryklund is a native of Prentice, Wis. He was graduated from The Stout Institute, received his B.A. degree at the Colorado College of Education, the M.A. degree at the University of Missouri, and a Ph.D. degree at the University of Minnesota.

Dr. Verne C. Fryklund

He taught in the public schools of Denver, and Greeley, Colo., Houston, Tex., and Detroit, Mich. At State Teachers College, Kearney, Neb., he was head of the industrial education department from 1922 to 1930. Then he became associate professor of industrial education at the University of Minnesota, which position he held from 1930 to 1937. During his stay at the University of Minnesota he also was on the staff of the Employment Stabilization Research Institute as industrial training specialist from 1931-33. From 1937 to 1941 he was supervisor of vocational education in the city schools of Detroit, and associate professor at Wayne University.

Then he returned to the University of Minnesota as associate professor in 1941, and remained there until he took up his duties in the army. His military assignments included the Armored Force, at Fort Knox, where he organized and directed the instructor training, and was responsible for the over-all instruction in the Armored School under General Stephen G. Henry. Later assignments were in the Office of the Assistant Chief of the Air Staff as Chief of Civilian Training for the air forces; and in the Office of the Air Surgeon, Personnel Distribution Command where he organized and directed the Convalescent Education Program in the Army Air Forces Convalescent Hospitals.

Dr. Fryklund is the author of several widely used books and bulletins in industrial education, and has been a regular contributor to professional magazines.

He is a Fellow of the American Association for the Advancement of Science, and holds memberships in the following organizations: Minnesota Academy of Science, American Vocational Association (life member), National Education Association, American Educational Research Association, American Association of Teacher Trainers in Vocational Education (president 1940), Michigan Industrial Education Society (life member), Manual Arts Conference (life chairman), Phi Delta Kappa, Epsilon Pi Tau (laureate mem-

(Continued on page 27A)

Peace Has Accelerated America's Training Program

. . . but B-G Service is Helping Schools . . . Keep Pace with it

THE suddenness with which V-J Day burst upon America has given tremendous unexpected acceleration to America's School Training Program.

With Uncle Sam speeding up discharges of returning service men and women, and war plants reconverting to peacetime production, many schools are faced with problems of . . . equipment . . . machines . . . supplies they didn't expect so soon.

Much of such anxiety over getting enough equipment, machines and supplies soon enough can be removed quickly and completely by consulting your B-G catalog . . . NOW . . . and then ordering all your needs at one time to expedite deliveries and eliminate duplicate routine. Schools wishing to establish Training departments, or enlarge present ones should communicate with us at once.

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The newest development in coated abrasives is the Durabonded—hardened bond process. Behr-Manning's new 14" x 18" wall chart features actual samples of the new product and tells the what, how and why of the Durabonded process. Complete with grit size, backing and abrasive recommendations for metal preparation, roughing and finishing, the new chart is available without charge to vocational shop and industrial arts instructors.

Drop a postcard or use the coupon to obtain your copy.

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(Division of Norton Company)
TROY, N. Y.
Educational Service Department

To:
BEHR-MANNING, TROY, N. Y.
EDUCATIONAL SERVICE DEPARTMENT
Please send me NEW Durabonded Chart.
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School .....
Address .....
City..... Zone..... State.....

WILL SOLVE THE PROBLEMS OF TOMORROW

It is the young men of today — the students of industrial arts — who must face the problems which will arise before tomorrow's engineering marvels become reality. And tomorrow, as today, the ingenuity and reliability of "Yankee" Fine Mechanics' Tools will make them fitting helpers for these future craftsmen in their challenging task. "Yankee" Tools are designed for teaching . . . for saving time in the classroom as they do in the workshops and on the assembly lines of the nation. Teach with the tools that experienced craftsmen have used for nearly half a century.

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make good mechanics better
North Bros. Mfg. Co., Phila. 33, U. S. A.
Established 1880

(Continued from page 24A)

ber), Mu Sigma Pi, Iota Lambda Sigma, and American Legion.

Dr. Fryklund's many Wisconsin friends will rejoice that he is back in his native state.

DR. BAWDEN HONORED FOR LONG SERVICE

Dr. William T. Bawden, who retired July 1 as head of the department of industrial education at Kansas State Teachers College, Pittsburg, was presented with a beautifully bound *Book of Friendship*, consisting of a collection of 153 personal letters from friends and well-wishers scattered throughout the 22 states, the District of Columbia, the Panama Canal Zone, and the South Pacific. The presentation took place on Saturday morning, August 25, during a brief

Left to right: Walter L. Friley, Rees H. Hughes, and Dr. William T. Bawden

ceremony in the office of President Rees H. Hughes, and was made by Professor Walter L. Friley, chairman of the faculty committee responsible for planning the project. The other members of the committee were Professor Leroy Brewington, of the School of Printing, and O. A. Hankammer, present head of the department.

Having passed the retirement age for administrators, as determined by the State Board of Regents, Dr. Bawden relinquished his responsibilities as head of the department, and will continue on full-time duty as editor of publications and co-ordinator of the Navy officer-training unit. He will reach his seventieth birthday this fall. He began his teaching career in September, 1896, after being graduated from Denison University in that year; consequently, he will complete fifty years of educational service next June, although out of these fifty years he subtracted three years for the purpose of postgraduate study.

He went to Kansas State Teachers College as guest professor in the Graduate School in the summer sessions of 1933, 1934, and 1935, and became head of the department of industrial education in September, 1935.

FREDERICK W. ZIEGENHAGEN APPOINTED PRINCIPAL

Frederick W. Ziegenhagen was appointed principal of the Boys' Trade and Technical High School, Milwaukee 4, Wis., on September 4, 1945. He succeeds Thomas G. Brown who retired on June 15.

Mr. Ziegenhagen served as industrial-arts teacher in the Milwaukee school system from 1913 to 1914. He was then transferred to the Boys' Trade and Technical High School the following year. In 1919 he was made chairman of the woodworking department (high school section), and served in that capacity until he was appointed vice-principal of the school in 1933. During this time he also served as principal of the evening classes of the Mechanics' Institute.

He served a 4-year apprenticeship as pattern-maker at the Allis-Chalmers Co., Milwaukee, and worked as a journeyman there for three years.

He holds B.S. and M.S. degrees, both of which were earned by him at the University of Wisconsin.

He has been active in professional circles and holds memberships in the National Education Association, the National Guidance Society, the American Vocational Association, the American Society of Tool Engineers, the Wisconsin Vocational Guidance Association, the Wisconsin Industrial Arts Association, the Industrial and Educational Counselors Association (President), and the Milwaukee Industrial Arts Association.

Frederick W. Ziegenhagen

Mr. Ziegenhagen had also contributed to the professional literature of his field.

♦ S. Grant Conner, effective August 1, 1945, was appointed associate professor of industrial education in the College of Education, University of Maryland, Baltimore, Md. Professor Conner comes to the university from a war-period service with the U. S. Office of Education as Special Representative, Trade and Industrial Education, where his talents were used in the program of training war-production workers.

Since 1921 Mr. Conner has successfully served in the field of trade and industrial education as shop and drawing instructor, and director of in-

(Continued on next page)

Filing Hints To Meet Your Needs
DON'T DRAG FILE
FORWARD STROKE:
Pressure is applied
RETURN STROKE:
No pressure is applied
on Return Stroke!
File teeth are intended to cut on the forward stroke only. For this reason no pressure should be applied during the return stroke. The file should be raised clear of the work. Failure to observe this precaution will dull the file and often destroy its usefulness.
However, there are two exceptions to this rule. In draw-filing, pressure is applied both on the forward and on the return strokes. This is done because, in order to get a shearing cut, the file is held at right angles to the direction of motion. In this position, the file is cutting at an angle without subjecting the teeth to destructive wear.
In filing soft metals such as lead, aluminum or brass, the file may be dragged lightly over the surface on the return stroke in order to free the teeth of chips. In this way clogging is prevented.
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HELLER BROTHERS COMPANY
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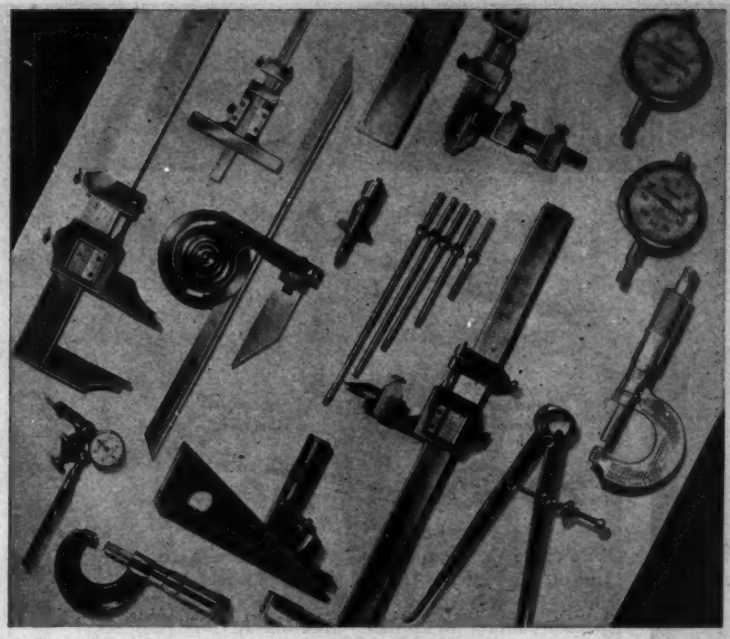

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STARRETT TOOLS

...Dial Indicators...Ground Flat Stock...Hacksaws...Metal Cutting Band Saws...Steel Tapes

(Continued from previous page)

dustrial education in various Pennsylvania schools, as District Apprentice Co-ordinator for Ohio with the University of Akron, as Senior Adviser in Industrial Education, Pennsylvania State Department of Education, as Supervisor of Industrial Teacher Training, New York State Department of Education, and for several years was on the summer session Industrial Teacher-Training staffs of Pennsylvania State College and the New York State Department of Education. He is the author or coauthor of numerous important apprentice training and industrial teacher-training manuals.

Professor Conner is a graduate of the Williamson Trade School as an indentured apprentice in wood patternmaking with three years journeyman trade experience and four years in executive capacity in the building supply business. He holds a B.S. and M.S. degree in industrial education from Pennsylvania State College augmented by advance graduate study at the University of Akron and the University of Pittsburgh.

♦ Dr. R. Lee Hornbake has joined the faculty of the University of Maryland, Baltimore 1, Md., as Associate Professor of Industrial Education, College of Education. Professor Hornbake has just completed three and one half-years as a Unit Head in charge of Manufacturing Training at the war-industry plant of the Curtiss-Wright Corporation, Airplane Division, Columbus, Ohio.

Predating his services at the Curtiss Wright plant, Dr. Hornbake had a wide and varied experience as teacher and teacher trainer in public schools and teacher's colleges. Following teaching experience in a junior-vocational high school he supervised and instructed industrial teacher-training work at the State Teachers Colleges at California, Pa., and Oswego, N. Y. He also was on the summer session staff in industrial education at Ohio State University.

Dr. Hornbake was educated in the public schools of Pennsylvania and holds a B.S. degree from the State Teachers College, California, Pa., and M.A. and Ph.D. degrees from Ohio State University.

♦ Ralph W. E. Bowers has been appointed head of the department of industrial-arts education at Southwestern Louisiana Institute, Lafayette, La. Mr. Bowers has a B.S. degree from McPherson College at Kansas and an M.S. degree from Iowa State college at Ames, Iowa. He has done graduate work at the University of Southern California, University of Kansas, University of California, and taught for 13 years in the public schools of Kansas. From 1942 to 1944 he was instructor in industrial arts at Louisiana State University, and comes to Southwestern from the State Department of Education, where he has served since July, 1944, as assistant supervisor of trades and industrial education in charge of industrial arts. Mr. Bowers is a native of Roanoke, Louisiana.

♦ G. Wesley Ketcham, formerly at the Senior High School, Norwalk, Conn., has been appointed state supervisor of industrial arts for the state of Connecticut.

♦ Dr. John H. Thorpe, formerly state supervisor of industrial arts for the state of Connecticut, has been appointed superintendent of schools at Cheshire, Conn.

♦ Edward E. Sheldon, adviser of the training department, Lakeside Press, Chicago, Ill., died June 4, 1945. He was frequently referred to as dean of printing education in Chicago, and was the author of texts and pamphlets on printing.

♦ Alfred K. Jones has been named co-ordinator of distributive education for the Indianapolis School System, Indianapolis, Ind.

♦ Edward E. Greene has been appointed vocational co-ordinator for the school system at Indianapolis, Ind.

As director of the War Production Program of Indianapolis, Mr. Greene supervised the training of 50,000 workers who entered war plants in a period of five years.

♦ Charles P. Dagwell has succeeded Roy V. Copple as athletic director at the Arsenal Technical High School in Indianapolis, Ind.

♦ Dana Prescott Vaughan has been appointed new dean of the Cooper Union Art School.

Dean Vaughan succeeds the late Dean Guy Gaylor Clark, who died suddenly last spring. The new dean formerly was director of the School of Industrial Arts in Trenton, N. J., and a lecturer in the University of Pennsylvania at Philadelphia. Before coming to Trenton, he was dean of the Rhode Island School of Design in Providence.

♦ The following have joined the faculty at The Stout Institute, Menomonie, Wis.:

Richard Oetting, formerly at the Kansas Wesleyan University, to teach psychology and education.

Frank W. Grube, from Joplin, Mo., to teach in the English department.

Herman Arneson, formerly at Valley City State Teachers College, Valley City, N. Dak., to teach in the biology department.

George Soderberg, from Saginaw, Mich., to teach in the wood finishing department.

Miss Sigrid Rasmussen, formerly at the University of Indiana, to teach in the art department.

♦ Clarence L. Wetzel, Regional Chief of Training, Region IX, War Manpower Commission, has resigned to return to his position as teacher trainer for the St. Louis public schools. He has been on leave of absence granted by the St. Louis board of education for several years while serving the war effort in the co-ordination of war-production training in WMC Region IX.

♦ Charles W. MacLean has been made assistant director of the Education Department, Westinghouse Electric and Manufacturing Co., Pittsburgh, Pa.

FOLDER DESCRIBES INDUSTRIAL X-RAY UNIT

A complete, self-contained industrial X-ray unit, providing a quick, accurate means for nondestructive examination of specimens for internal flaws, is described in a new folder announced by the North American Philips Company, Inc., 100 East 42nd St., New York 17, N. Y.

The folder tells how the Searchray 150 unit works, and lists its advantages and applications. Several photographs illustrate its use in X-ray examinations of aluminum, steel, copper, plastics, die castings, small electrical parts, tubes, etc.

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By S. N. LeCount and H. S. Dusenbery

Highly recommended by the Supervisor of Shipyard Training for the U. S. Maritime Commission "for all those who wish to make a career for themselves in marine electricity because it is simple, concise and complete, and contains the specific things a marine electrician must know." Written by practical men, this book provides a course that will produce *employable* workers. $3.50

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Principles of Radio for Operators

By Ralph Atherton

Clear, practical instruction in the operating principles of all parts of radio, including antennas, with full details about commercial equipment and procedures for construction, operation, and repair. The material is presented in units most convenient for class work. Many of the unusually effective teaching aids used in the intensive Navy training are included. $3.75

Machine Shop Operations

By Lewis E. King

Published:

LATHE OPERATIONS; MILLING MACHINE OPERATIONS.

Each $1.75

Coming:

SHAPER OPERATIONS; BENCH OPERATIONS; GRINDER OPERATIONS

Written by the head of the Machine Shop Department in the Detroit Aero Mechanics Vocational High School, these manuals supply the technical information and guidance needed to keep all the students in a shop class working effectively all of the time. Their complete instruction on the machine and its parts, on setting the machine and the work for each operation, and on the various "tricks of the trade" insure good work without waste or damage.

Shop Job Sheets in Radio

By R. N. Auble

Book 1: Fundamentals; *Book 2:* Service Problems.
Each $1.50

Used in Signal Corps training, the material in these shop manuals has been perfected for the most thorough and practical kind of training. Step-by-step exercises, each accompanied by large clear diagrams, in the practical application of electrical principles to the various radio components, in the use of the serviceman's tools, and in the actual construction of power supplies, amplifiers, receivers and transmitters.

Introduction to Practical Radio

By D. J. Tucker

Gives the beginner the *thorough* knowledge of the *indispensable* essentials he must have for any kind of radio work. Written in the simplest, clearest English, with helpful explanations of the necessary mathematics at the points where it is needed. $3.00

Engineering Preview

By L. E. Grinter and Others

Widely recommended by admissions advisers in engineering colleges as an excellent guide and preparation for high school students. Gives a complete "preview" of the basic work and skills required in engineering or technical work. $4.50

Aerodynamics *By L. R. Parkinson*

An excellent introduction to this subject for high school students, simply written, covering all essentials, and including much practical reference data. $2.25

To be published this winter

Aircraft Woodwork

By R. H. Drake

Gives all the practical instruction and information needed to obtain an aircraft mechanics license in woodwork, including the necessary background knowledge of woods as well as complete instruction in the use of woodworking tools, glues, dopes, etc.; in blue-print reading; and in the step-by-step construction and repair of the various wood and fabric-covered parts of aircraft. $3.50 *(Probable)*

Plastic Craft

By E. S. DeWick and John Cooper

Prepared by teachers who have instituted plastics work in hundreds of schools, this is a richly illustrated how-to-do-it book on handcraft work in plastics suitable for use in any kind of shop—metal, wood, or general. Complete information on modern plastic materials and over 100 projects offering the teacher a wide choice according to the tools available.

$4.25 *(Probable)*

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Association News

♦ The Indiana Vocational Association will hold its annual convention at Indianapolis, Ind., on October 25, 1945. Headquarters will be located at the Arsenal Technical High School.

♦ The National Council for the Social Studies will hold its twenty-fifth annual meeting at the Hotel Schroeder, Milwaukee, Wis., on November 22, 23, and 24, 1945.

The general theme of the meeting will be "Facing the Over-All Tasks in Social Education," and the meetings will deal with problems and issues facing social studies teachers in curriculum planning and classroom procedures as they seek to discharge their responsibilities in training citizens for tomorrow's world.

There will be an exhibit of educational materials of interest to social studies teachers. For further details write to Merrill F. Hartshorn, Executive Secretary, National Council for the Social Studies, 1201 Sixteenth St., N.W., Washington 6, D. C.

Questions and Answers

PURPLE LAYOUT DYE

1114. Q.: In item 90 of the machine-shop test on page 212 of the May, 1945, INDUSTRIAL ARTS AND VOCATIONAL EDUCATION Magazine, Fred E. Decker refers to a purple layout dye. Where can this be obtained? — *J. D.*

A.: Purple layout dye may be purchased, ready for use, from the Dayton Rogers Mfg. Co., Minneapolis, Minn. — *F. E. D.*

COST OF PLUMBING EQUIPMENT

1115. Q.: Kindly give me an approximate inventory cost of installing a trade course in plumbing. There would be approximately 25 students. — *H. G.*

A.: The approximate cost for such a course for 25 students would be about $25,000 for tools, fixtures, and equipment. This inventory is based on the objective of training boys to cover approximately 2000 hours of actual trade-shop instruction. In addition to this trade-shop work, he receives about 300 hours of applied drawing, applied math, and applied science. The basic operating expense, involving only replacement equipment and supplies, is about $3,300 a year.

The trade work covered by beginners is lead joint wiping and simple plumbing fixture connections, culminating with the finished installation of plumbing and fixtures completely from the basement to the second floor.

All of this work is first laid out, estimated, planned, and finally installed. It is not accepted unless the installation can pass the cold water test, meaning that it has been hooked up with the city water system and put under direct city pressure. If no leak occurs anywhere, the project receives a final okay.

The necessary tools and equipment consist of the following items: 15 large sheet-metal tables, approximately 4 by 8 ft., each furnished with two lead pots. All of the needed tools are checked out through the toolroom. Plumbing supplies are checked though the supply room.

Bulletin No. 200 entitled "Related Instruction for Plumbing Apprentices," obtainable from the United States Department of the Interior, Office of Education, Washington, D. C., will prove very helpful. In addition to this, there is also a splendid pamphlet prepared by the National Association of Master Plumbers. Both of these pamphlets have suggestive courses of study which may prove helpful. — *F. W. Ziegenhagen.*

News Notes

♦ The general theme for the 1945 American Education Week is "Education to Promote the General Welfare."

The daily topics are outlined as follows:

Sunday, November 11 — Emphasizing spiritual values
Monday, November 12 — Finishing the war
Tuesday, November 13 — Securing the peace
Wednesday, November 14 — Improving economic well-being
Thursday, November 15 — Strengthening home life
Friday, November 16, — Developing good citizens
Saturday, November 17 — Building sound health

American Education Week is sponsored by the National Education Association, the American Legion, The United States Office of Education, and the National Congress of Parents and Teachers, in co-operation with other national, state, and local groups.

♦ Diversified occupational training, and home economics on the vocational basis, as well as junior college courses for the G.I.'s and WACS at the La Junta Air Base have been added to the school subjects offered at La Junta, Colo.

♦ A new kodachrome sound motion picture, "400 Years in 4 Minutes," depicting the new Betty Crocker method of cake making, has just been completed by General Mills, Inc., Minneapolis 15, Minn. This 16mm. film, 22 minutes in length, is being distributed by Harvey & Howe, Inc., 919 North Michigan Blvd., Chicago.

The movie is followed by a 35mm. film strip containing significant stills from the picture to

(Continued on page 32A)

POWER

HIGH VOLTAGE POWER SUPPLY

This is the RA-38 power supply—another of the numerous valuable items in the group of government radio and electronic supplies offered for general distribution through the Hallicrafters Co., agent for RFC under Contract SIA-3-24.

Output voltage continuously variable from 0 to 15,000 volts. Can be easily adapted to deliver up to 6,000 volts at 1 ampere. Excellent power supply for laboratory work or can be used as power source for broadcast stations, induction heating equipment, vacuum tube life tests and many other industrial applications.

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Tannewitz DI-SAW

The DI-SAW is truly a machine of revolutionary character — one that is growing in popularity by leaps and bounds. Shortly no metal-working shop worthy of the name will be without them. That's why we say that in your endeavor to do a practical job of vocational training, to fit modern youth to earn their living, the DI-SAW is your No. 1 machine requirement. What makes this machine so revolutionary in character? The fact that in addition to the production of dies, an almost endless variety of tools and parts can be made with it from practically any material including alloy steels. The accompanying diagrams merely suggest the possibilities. By all means get the complete facts concerning this machine. No other single machine offers so wide a field for trained operators. Simply ask for "DI-SAW" bulletin.

THE TANNEWITZ WORKS
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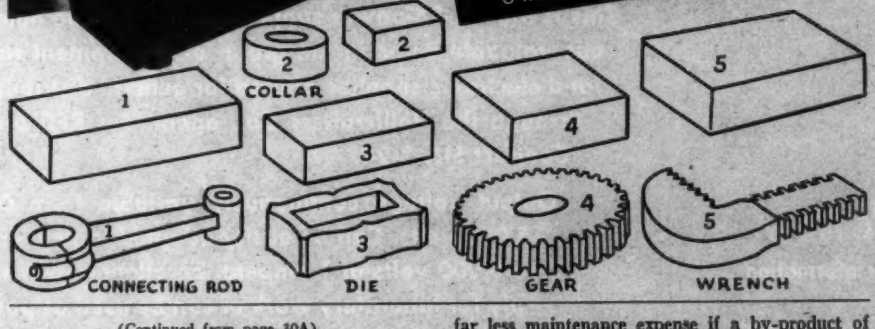


(Continued from page 30A)

provide a review of high lights of the presentation and forms a basis for classroom discussion. A literature kit is also provided which includes a teacher's source book for the assistance of group leaders in conducting student discussion.

♦ "Vibration in Industry" is the title of an interesting 12-page booklet which describes the effect of vibrations on the workers and on the machine. The book also describes how vibrations can be controlled. The publisher of this book is The Korfund Co., Inc., 48–15 Thirty-second Place, Long Island City 1, N. Y.

♦ The results of scientific research recently completed by chemists at Ohio State University and published currently in *Industrial and Engineering Chemistry, Journal of American Chemical Society,* indicate that concrete will last much longer with far less maintenance expense if a by-product of the paper industry is added to the cement used.

The investigation showed that when a small amount of a lignin product, calcium lignosulfonate, made from paper mill waste, is added, the cement particles are dispersed by electrostatic action, and tests made for federal departments have proved that concrete produced with dispersed cement is stronger, less porous, and lasts four to five times longer than when made with plain cement.

♦ For a catalog on tools and materials for watchmakers, jewelers and opticians, write to Henry Paulson & Co., 37 S. Wabash Ave., Chicago, Ill.

♦ "Optonic Colors" is the title of a 24-page booklet which makes good reading for those who have to select the color scheme for redecorating classrooms and school shops. Write to The Arco Co., 7301 Bessemer Ave., Cleveland 4, Ohio.

♦ Gen. Omar N. Bradley, administrator of Veterans Affairs, has approved a 12-month earn-while-learning program for young women and men using the facilities of the Philadelphia School of Occupational Therapy, Philadelphia, Pa., and the St. Louis School of Occupational Therapy and Recreation, St. Louis, Mo., for the training of occupational therapists to meet the expanding needs of the Veterans Administration, the agency announced recently.

Courses for 36 students at each school are scheduled to open November 1, 1945. The age limit for students is 35 years, and qualifications are graduation from an accredited college, with major studies in fine or applied arts, industrial arts or home economics, and adequate knowledge of at least three different skills such as woodwork, photography, weaving, metalwork, ceramics, plastic, printing, carving, bookbinding, or varied crafts including leatherwork, cord knitting, fly tying, and possibly other miscellaneous skills.

College graduates, preferably women, who are under 35 years of age and who are interested in enrolling for these courses are urged to communicate immediately with the Medical Director, Veterans Administration, Vermont Avenue between H and I Sts., N.W., Washington 25, D. C.

♦ "Of Kids and Goats" is the title of a booklike kit prepared by the Allied Kid Co., 100 Gold St., New York 7, N. Y. The kit contains pictures of some of the important operations by which kid and goat skins from Asia, Africa, Europe, and South America are unhaired, tanned, dyed, and finished in the Wilmington tanneries of the Allied Kid Company.

Small bottles of chemicals and dyestuffs illustrate some of the materials necessary for the processing of skins.

♦ Abstracts on the occupations in the fields of medicine, nursing, and medical laboratory technology have just been published by Occupational Index, Inc., New York University, New York 3, N. Y.

♦ Panama and Paraguay have adopted vocational education programs. Both countries are planning to build vocational schools in the near future.

♦ A new sound motion picture entitled "Progressive Honing and Automatic Sizing," has just been produced by the Jam Handy Organization, 2900 East Grand Blvd., Detroit 11, Mich.

This film on metal finishing problems is shown free of charge to those interested. For details regarding showings of the film, address The Micromatic Hone Corp., 8100 Schoolcraft Ave., Detroit, Mich.

♦ More vocational advisers are needed at both Hines Veterans' Administration hospital in Illinois and the Wood Veterans' Administration hospital in Wisconsin to take care of the increasing demands of veterans recuperating from injuries received in combat areas.

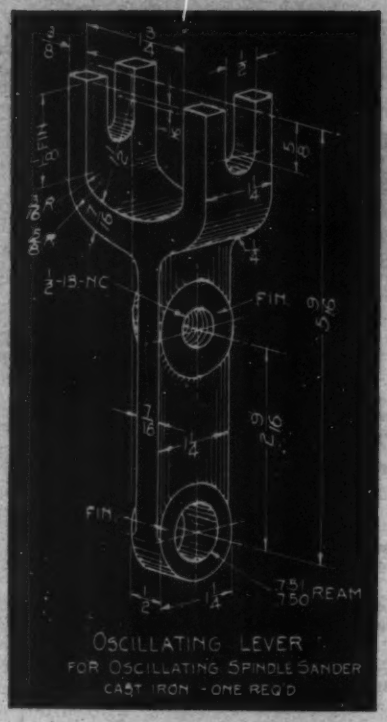
The duties of the adviser are fully explained in a circular being issued by the U. S. Civil Service Commission. Further information may be obtained and applications filed at the Commission's regional office, 433 W. Van Buren St., Chicago 7, Ill., or at any first or second class post office in Illinois and Wisconsin.

♦ "Printing and World Peace" is the general topic for the 1945–46 Essay Contest sponsored by the National Graphic Arts Education Association in co-operation with International Printing Ink. The contest is open to students in the ninth year of the junior high schools, senior high schools and trade and preparatory schools, and particularly in schools where printing instruction is offered. The essays should be from 400 to 700 words in length, and may be typed, written in ink on one side, or printed. The essays must be submitted to the National Graphic Arts Education Association on or before midnight, December 1, 1945.

For complete information write to the National Graphic Arts Education Association, 719 Fifteenth Street, N.W., Washington 5, D. C.

♦ A booklet entitled "Movies Go to Work," primarily designed to give industry the reasons for adopting motion pictures as a management tool and telling what steps to take to "get going — and keep going — right," has just been announced by Bell & Howell Company, Chicago pioneer producer of motion picture equipment. It contains implications for schools who do not as yet make use of movies in their instructional work.

Copies of the booklet may be obtained free by addressing Bell & Howell Company, 7100 McCormick Road, Chicago 45, Ill.



Here's November's Problem!

This month's problem is another in Dixon's original and exclusive Eldorado Blueprint Series for Instructors.

Have your students draw the correct orthographic views of this Oscillating Lever for Oscillating Spindle Sander.

The problem for December will be a good one, too. Look for it next month.

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Division of The Borden Company
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At leading hardware, hobby and art supply shops — or if not available write us direct

AIRCRAFT SHEET-METAL WORK

ISADORE M. FENN

Chicago Vocational School
Chicago, Ill.

(Continued from page 38A, September, 1945, issue)

Q. 59. *Why are a large per cent of soldered joints defective?*

Ans. This is due to improper cleaning and fitting of the parts to be joined. The metal surfaces must be kept chemically clean and free from oxide throughout the soldering operation.

Q. 60. *Is the selection of the proper flux important?*

Ans. Yes, although most metals can be soldered by the use of zinc chloride.

Q. 61. *Why is flux used in soldering?*

Ans. Flux is used to remove and prevent oxides.

Q. 62. *When should rosin or some other noncorrosive flux be used?*

Ans. In soldering electrical connections and other parts that must be kept free from corrosion.

Q. 63. *What are the most important points in soft soldering?*

Ans. Thorough cleaning of the parts to be joined, careful fitting, and application of the proper flux.

Q. 64. *In the process of soldering, how may the parts be cleaned?*

Ans. By scraping, filing, or brushing with a wire brush, in order that all scale, dirt, and oxides be removed.

Q. 65. *In soldering, what procedure should be followed after the surfaces of the parts to be joined have been cleaned?*

Ans. The parts should be fitted in place, then coated with a suitable flux, after which the application of the hot soldering copper and the proper amount of melted solder to the adjoining parts will cause them to adhere.

Q. 66. *What is meant by sweating solder?*

Ans. Sweating is a form of soldering and may be accomplished by tinning both surfaces of the pieces to be joined. Then the tinned surfaces are brought together under pressure, and heated until the solder melts and the two pieces are united.

Q. 67. *May soft solders be used for soldering most commercial metals?*

Ans. Yes. Soft solder consists chiefly of tin and lead. When these two metals are alloyed together in equal proportions to form half-and-half solder, the melting point is about 360 deg. F.

Q. 68. *What soft solder is considered best for airplane work?*

Ans. Grade A tin and lead solder. It is composed of 99.65 per cent tin and lead, alloyed in equal amounts, while the remainder is copper and antimony. The melting point is 357.8 deg. F.

Q. 69. *What do tests of tensile strength of tin content based upon cast strips and bars indicate?*

Ans. The higher the tin content (up to 75 per cent tin and 25 per cent lead) the greater the breaking strength.

Q. 70. *What do tests in the case of two pieces of tin-plate, or like metals soldered together indicate?*

Ans. The maximum strength is obtained by solder of approximately 50 per cent tin and 50 per cent lead.

Q. 71. *How may the strength of soft-soldered joints be increased?*

Ans. By keeping the film of solder between the tinned surfaces of the joint quite thin.

- Heavy bronze bearings
- 1" Collet capacity
- 11¼-inch swing
- Double-walled apron
- Large hardened and ground spindle
- Extreme accuracy
- Convenient controls
- Underneath V-belt motor drive
- All Steel Bench

. . . compare a SHELDON S-56 Precision lathe with all other 10" lathes in the moderate priced field, and you'll find more accuracy, more capacity, more convenience, more design, more quality . . . from any angle just more lathe.

The SHELDON S-56 lathe has a bed length of 56", with rigid T-girted bed with 2 V-ways and 2 Flat ways which are ground and hand scraped to .0005" of both lateral and parallel alignment. Lead screws are cut on the finest Pratt & Whitney "super precision" lead screw machine. The S-56 lathe with 56" bed is mounted on a rigid 5 drawer steel bench (S-44 with 44" bed on a 4 drawer steel bench) which houses an efficient 4-speed (8 spindle speed) underneath motor drive. Each come with full quick change gears, power longitudinal and cross feeds and standard big lathe features.

SHELDON MACHINE CO., INC.
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Builders of Good Lathes Since 1919

Q. 72. *What does high-melting-point solder contain?*

Ans. This solder contains lead and silver and has a melting point of from 580 to 700 deg. F.

Q. 73. *When is high-melting-point solder chiefly used?*

Ans. When soldering Prestone radiators and other points subject to higher temperatures than lead and tin solders would stand. It is available in wire, bar, and granulated form.

Q. 74. *What is hard soldering?*

Ans. Hard soldering is a process of soldering with a composition of copper, zinc, silver, and tin.

Q. 75. *State the use of hard solder.*

Ans. This solder is used for soldering band saws; copper, brass, and bronze parts; turbine blades; high pressure and temperature pipe connections; gasoline pipe nipple joints, etc.

Q. 76. *Why is hard solder used for this class of soldering?*

Ans. Because of its strength at comparatively high temperatures and its fatigue resistant properties. Soft soldered gasoline and oil pipe joints, etc., invariably fracture with repeated vibration.

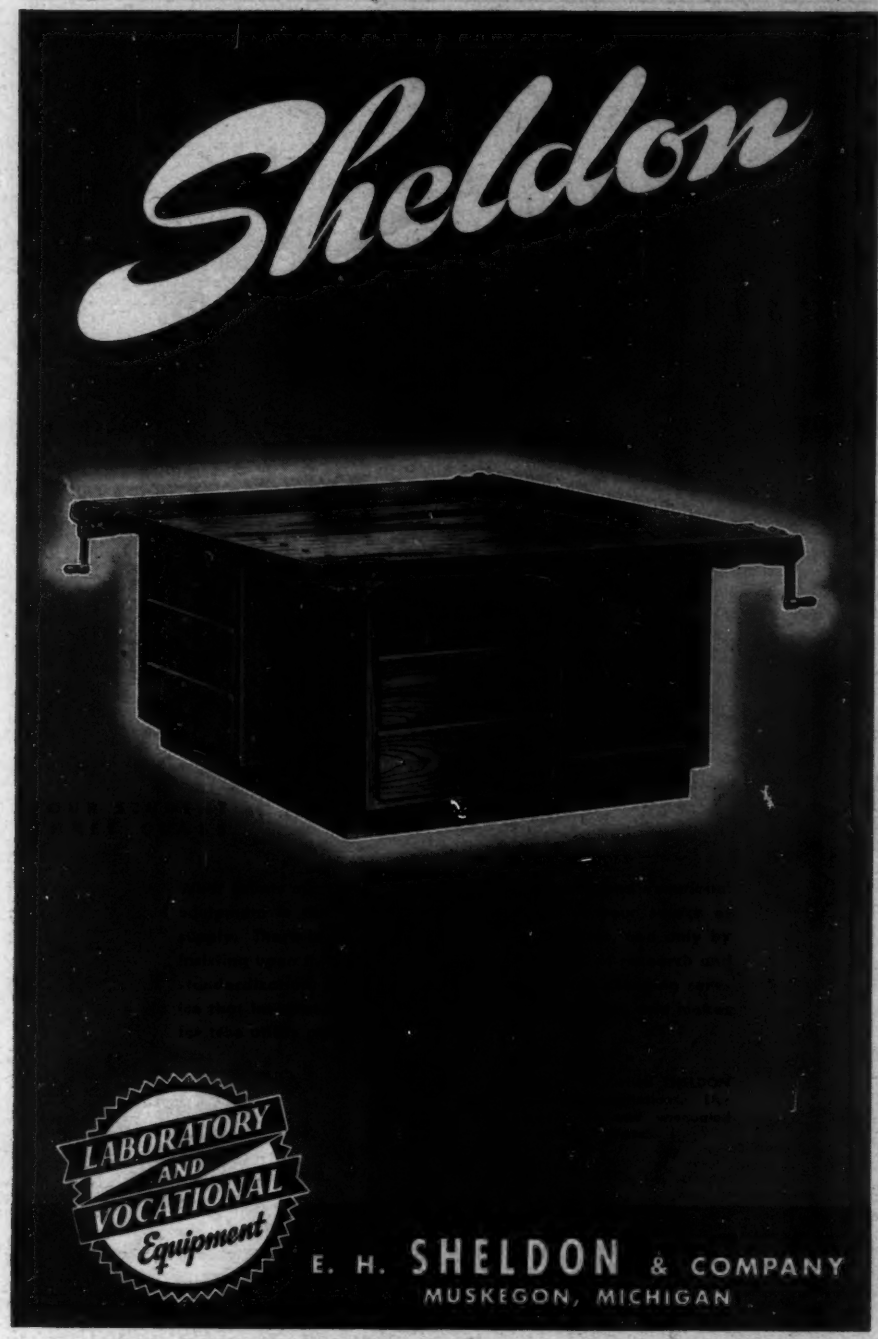
Q. 77. *What must be done to soldering coppers before they are ready for use?*

Ans. Soldering coppers of the proper size and weight must be tinned.

Q. 78. *How are soldering coppers tinned?*

Ans. First heat the copper to a bright red, then clean the point by filing to the desired shape. Use sal ammoniac to clean the surface thoroughly; this will facilitate the adhesion of the solder in tinning. The final step in tinning

(Continued on next page)



(Continued from previous page)

is accomplished by melting a few drops of solder on a block of sal ammoniac and rubbing the copper over it until the tip is well coated with the solder.

Q. 79. *How is the point of the soldering copper kept clean during the process of soldering?*

Ans. By dipping occasionally in a solution of one part of sal ammoniac to 30 parts of water. This solution should be kept in an earthenware vessel.

(To be continued)

The rate of accidents on school grounds in May, 1944, doubled the rate for April, 1944. — *Safety News.*

New Publications

Shopwork on the Farm

M. M. Jones. Cloth, 486 pages, 6 by 9 in., illustrated. Price, $2.24. McGraw-Hill Book Co., Inc., New York and London.

A book for the student of vocational agriculture and for the farmer who has or intends to fit up a farm shop in which he can make needed repairs, build new equipment, and do other maintenance jobs.

There are 14 sections in which the following subjects are discussed: equipping the farm shop; sketching and drawing; farm carpentry; painting and finishing; sharpening and fitting hand tools; rope work; harness and belt work; concrete work; soldering and sheet-metal work; cold-metal work; forging, tempering, and welding; pipework and simple plumbing; repairing and reconditioning machinery; and electrical maintenance work. The book also contains a glossary of shop terms.

Machine Tool Guide

By Tom C. Plumridge, Roy W. Boyd, Jr., and James McKinney, Jr. Loose leaf, leatherette binding, 630 pages, 8½ by 11 in., illustrated. Price, $7.50. American Technical Society, Chicago 37, Ill.

This machine tool guide is the answer to the prayers of many engineers and tool designers for it gives them in one volume what was heretofore scattered over many individual catalogs and service manuals.

It is a reference book filled with specifications, dimension tables, and line drawings of the following types of modern machine tools. Automatics; boring, broaching, contour, drilling (vertical, radial, and hydraulic feed) machines; duplicators; gear cutters; grinders; lathes (engine, axle, and turret); planers; presses; shapers; slotters; hobbing, milling, and tapping machines.

It also possesses value as a reference book in part-time and full-time schools, and in the machine design courses of universities and colleges.

Occupational Data for Counselors

Bulletin No. 817, United States Department of Labor, Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price, 10 cents.

A very useful bulletin containing data on the major occupation groups, employment date on selected occupations, and tables summarizing the available occupational data.

The Machinists' and Draftsmen's Handbook

By Albert M. Wagener and Harlan R. Arthur. Cloth, 662 pages, 5⅝ by 8 in. Price, $4.50. D. Van Nostrand Co., Inc., 250 Fourth Ave., New York City.

A valuable reference book for the machinist and draftsman. It contains needed essential information on mathematical formulas, geometrical construction, weights and measures, triangulation, drills, screws and screw threads, spur gearing, milling tables, tapers, cutting speeds and feeds, dies and presses, strength of material, and mechanics.

Chemistry for Electrotypers

By C. B. F. Young. Cloth, 205 pages, 5⅝ by 8¼ in. Price, $4. The Chemical Publishing Co., Inc., 234 King St., Brooklyn, N. Y.

A book designed to give the electroplater who knows the *how* of his trade, an understanding of the *why* as well. The book is quite technical, yet it is written so that the earnest student will have little trouble in acquiring a thorough grasp of the subject.

Key to Weaving

By Mary E. Black. Cloth, 312 pages, 7¾ by 10¼ in., illustrated. Price, $5. The Bruce Publishing Co., 540 North Milwaukee St., Milwaukee 1, Wis.

The author of this book has studied the art of weaving both in this country and in Sweden. She has also taught weaving for a number of years, and knows just the things that trouble the beginner.

Into this book she has succeeded in putting her own love of the art, and she describes equipment and operations in such simple terms that the student can follow readily.

The 11 chapters of the book acquaint the reader with the loom; how to prepare it for weaving; two-, three-, four-, five-, six-, and eight-harness weaves; weaving homespuns; and finally, rag rugs.

The book also contains a glossary of weaving terms, and a helpful bibliography.

How to Get the Job You Want

By John W. Herdegen. Paper cover, 92 pages, 6½ by 9½ in. Price, $1. Published by Essential Books, 270 Madison Ave., New York City.

A challenging book written in a common sense way. It is not only for the man or woman who is seeking a job, but would make excellent reading for any worker, no matter what his position.

Practical Design for Arc Welding, Vol. 3

By Robert E. Kinkead. Cloth, 200 pages, 8¾ by 11⅛ in. Price, $3.50. Volumes 1, 2, and 3 in one set, $10. Published by The Hobart Brothers Company, Troy, Ohio.

(See "Publications" page 38A)

TEACH AVIATION THE MODERN WAY!

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First . . . Teach aviation construction by building this glider in your Industrial Arts or Vocational shop. A product of the SCHWEIZER AIRCRAFT CORP., foremost builders of gliders and sailplanes in America, this glider is supplied in simple, easy to build kit form, especially designed for construction by schools or other qualified groups. Then . . . Use the shop-made glider to teach your students the basic fundamentals of flight the safest and most inexpensive way.

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SHOP BOOKS

METALWORK, TECH. & PRACTICE

Describes tools, materials and operations of many metalworking occupations, including machine shop, automotive, aeronautical, metal pattern making, etc. Modern Handbook for Metal Trades. 400 pps. $4. Ludwig.

GENERAL SHOP METALWORK

This book contains valuable information about metals, abrasives and their uses. Instruction for beginners in 4 areas of metalwork: bench, sheet, art and ornamental metal. $.60 Dragoo & Dragoo.

APPLIED FUNDAMENTALS OF MACHINES

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Dept. 10V, 165 East Third Street
Mt. Vernon, N. Y.

PUBLICATIONS

(Continued from page 36A)

This is the third and final volume in this valuable series on welding design. Twenty of the design plates in Volume 3 show common faults frequently encountered. In another twenty plates the author shows the natural prototypes of many of the designs used by man, and in the final plates are shown typical patents granted in connection with the welding process.

Data for State-Wide Planning of Veterans' Education

By Ernest V. Hollis. Paper, 69 pages, 5⅞ by 9 in. Bulletin 1945, No. 4. Federal Security Agency, U. S. Offices of Education, Superintendent of Documents, Washington 25, D. C.

(See "Publications" page 41A)

Shop Equipment News

New Products—Publications

NEW SOUTH BEND V-BELT 9-IN. LATHE

Latest addition to the South Bend Lathe Works' line is a V-belt drive 9-in. precision bench lathe which is illustrated and described for the first time in their Catalog 9-G, just off the press.

Made especially for those who prefer the several advantages of the V-belt drive, this bench lathe features 4-step, V-belt cone pulleys which, with the back gears, provide either 8 or 16 spindle speeds ranging from 46 to 1176 r.p.m. It is made with either quick-change gear or plain change gear equipment for a wide range of thread cutting and power longitudinal feeds. Two of the models incorporate power cross feeds.

9 in. Precision lathe

All models have a 9¼-in. swing over the bed and saddle wings, and ¾-in. headstock spindle hole with maximum collet capacity of ½ in. Choice of bed lengths give maximum distances between centers up to 34 in. The usual line of practical South Bend Attachments is available for special classes of work.

Complete, detailed information on this model can be obtained by writing to the South Bend Lathe Works, 178 E. Madison St., South Bend 22, Ind.

For brief reference use IAVE—910.

NEW BALDOR ELECTRIC GRINDER

The Baldor Electric Company, St. Louis, Mo., has developed a new 8-in. grinder for their No. 8100 series. The outstanding features of this new development are a very substantial ¾-in. arbor, exhaust type guard and best quality wheels. For further information write the manufacturer for their bulletin No. 321.

For brief reference use IAVE—911.

A NEW DEVICE FOR GLUING DOWEL JOINTS

The assembly gun, shown in the accompanying illustration, is a new development by The Franklin Glue Co., Columbus 16, Ohio, manufacturers of liquid hide glue.

Assembly glue gun

Eliminating all waste and a great boon to cleanliness around the work shop, the assembly gun is specially designed for gluing dowel joints.

The gun is made from a regular Eagle Hydraulic Oil Can of one pint capacity. The nozzle, about 6 in. long, extends at right angles from the can and is slightly bent at the end, which is plugged with solder.

Holes are bored in the sides of the nozzle ¼ in. to ½ in. from the end. This enables the glue to be squeezed out of the sides of the nozzle onto the sides of the dowel holes where the glue properly belongs.

In order to have a uniform flow of glue for each dowel hole, an adjustment screw is placed on the plunger. This can be set so that the right amount of glue can be squeezed out for each dowel hole. Using Franklin Glue makes it possible to fill the assembly gun and use until empty.

Franklin, being a liquid hide glue, will always be ready to use at normal room temperature.

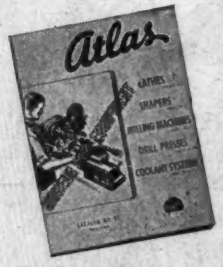
For brief reference use IAVE—912.

MECHANICAL SKILLS WILL NEVER AGAIN BE NEGLECTED

IT TOOK the disaster of war to bring home to America the importance of giving every youth a *full* opportunity to make use of special talents. Mediocre academic students often became high ranking technical officers. For many, it was the first time their mechanical skills were fully recognized and encouraged. They "flowered" overnight.

American education will now be challenged as never before to make the most of individual aptitudes. In vocational departments this will mean *adequate* equipment—enough machine tools so that each student can acquire practical working skills.

Atlas compact bench tools are ideally suited for class room work. They encourage precision. They include all operating safeguards. They are made by advanced mass production methods which reduce costs so that more machines can be included in your equipment budget. For full information and tool specifications send for latest catalog.



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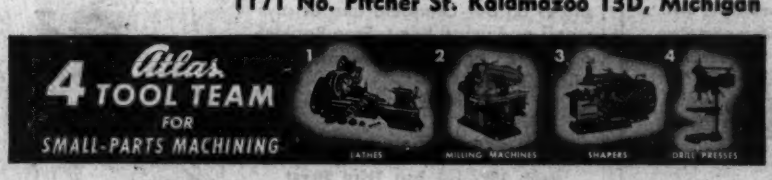

(Continued on page 22A)

CIMCOOL CUTTING FLUID

A new cutting fluid known as Cimcool, manufactured and distributed by The Cincinnati Milling Machine Co., was recently announced by the Cimcool Division of that organization. The new product is a general purpose cutting fluid, finding its principal application in turning, milling, drilling, and grinding.

For its friction reducing properties, Cimcool relies on chemicals to form low shear strength compounds at the contact area between the chip and the tool. For its cooling properties, this cutting fluid has ingredients which absorb heat by physical change.

Cimcool dispenser reservoir

Besides promising longer tool life, this cutting fluid is preferred by operators because of its cleanliness and absence of slippery film on measuring tools and machine controls.

To simplify the use of Cimcool, the manufacturer offers several sizes and styles of dispensing reservoirs and tank wagons, one of which is illustrated here. Literature may be obtained by writing to Cimcool Division of The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

For brief reference use IAVE—913.

THE NEW TOOL STEEL "DUNKIRK EZ"

From 25 per cent to more than 200 per cent faster machinability is provided by a new tool steel announced today by the Allegheny Ludlum Steel Corp., Brackenridge, Pa. The new product, identified as "Dunkirk EZ," is a free-machining steel which possesses great possibilities in the fields of cold work applications, and tool steel machined parts, such as dies, gauges, forming rolls, bushings, liners, and bodies for multiple-edge tipped tools.

Extensive research in steel making techniques paved the way for the company's introduction of the free-machining, oil hardening steel. Its free-cutting qualities make it adaptable for tool steel parts turned out on screw machines and turret lathes, where fast machining is desirable.

"Dunkirk EZ" will harden to about 65 Rockwell C when oil quenches from 1450–1550 deg. F., and may be tempered up to 500 deg. F. without softening under 60 Rockwell C.

For special application, Dunkirk EZ can be supplied in the form of bars, blocks, rings, dies, etc., in the normalized condition at 250–275 Brinell at which hardness good machinability is still obtained.

For brief reference use IAVE—914.

CARBON RESTORATION FOR HEAT TREATERS

The "skin recovery" or carbon restoration process by the use of a controlled gas atmosphere is described in Bulletin No. SC-125 just issued by Surface Combustion Corp., Toledo 1, Ohio. Application of the process in preventing decarburization of various steels and how it differs from the process of carburization is also covered.

The method is applicable to both carbon and alloy steels. It maintains the carbon content of the surface of the material, prevents reduction of its endurance limit under repeated stresses, and often eliminates the need for machining operations subsequent to heat treatment. Various photomicrographs indicate the effect of the process on

(Continued on next page)

A "MUST" IN EVERY ENGINE SERVICING COURSE

K&W Mechanical Method

OF RESTORING CRACKED ENGINE HEADS AND BLOCKS TO UNIMPAIRED SERVICE

TEACH THIS VITAL AND REMUNERATIVE ENGINE REPAIR METHOD

Repairing cracked or broken automotive and diesel engine blocks and heads by the K & W Mechanical Method is now standard practice with hundreds of fleet operators, engine builders and garages. It is used extensively by the Armed Forces and taught by ODT Training Schools. This method seals practically any heat, freeze or stress cracks in surprisingly fast time and the repair is guaranteed to last the life of the engine. No operation in servicing engines saves so much money in so little time.

NO ADDITIONAL SHOP EQUIPMENT NECESSARY

Tools required to make K&W Mechanical repairs are the type of portable power tools that are standard equipment in practically all school shops.

INFORMATION AND TRAINING

Complete information on the K & W Mechanical Method will be furnished you; or we will train your instructors without charge.

Learn more about the K & W Mechanical Method. Write.

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BLOOMINGTON, INDIANA

Schools Use Engine Overhaul Stands to Teach and Demonstrate Automotive and Aircraft Engine Overhauling Because of Their Mobility, Safety and Positive Instructional Values to Teacher and Student in Both Classroom and Shop.

The Clayborne Manufacturing Co., 209 South LaSalle Street, Chicago 4, Illinois, announces a new style adjustable Universal Engine Overhaul Stand, Model 201, which handles all in-line Automotive Engines to approximately 600 lbs. weight. It also positions transmission, differentials and rear axle assemblies.

It is ideal for instruction and for use in rebuilding all types of engines (except the V-type) where the cylinder banks are not brought into vertical position for cylinder boring by a stand of end-rail over-type.

This stand has an indexing device on each side rail — one has spring — one is plain. Mounts approximately 80% of automotive engines without resorting to the 6-inch expansion. Trunnion castings are offset 2 inches to increase clearance for clutch housings. The stand is completely mobile, safe and easy to use with plenty of room. This stand handles complete engine with oil pan, clutch housing and accessories.

Completely illustrated and descriptive folders are available on Automotive, Aviation and this new style adjustable Universal Engine Overhaul Stand, Model 201. Also on the Ford V-8 Engine Overhaul Stand, which with extra frames handles Chevrolet and Dodge-Plymouth Short Block Assemblies. Large stands for heavy bus, truck and tractor engines are available as well as for aircraft engines. Address your request or inquiry to: Clayborne Manufacturing Co., Dept. "I" 209 South LaSalle Street, Chicago 4, Illinois.

(Continued from previous page)

several types of steels. Charts showing the unbalanced carbon concentration from surface to core metal obtained by the carburizing process and the balanced condition when the skin recovery process is used, are also included.

To illustrate the difference between normal heat treatment and skin recovery process, a chart of Vickers Micro-Hardness for depths up to 0.050 in. for both treatments is shown. Carbon content of the original material is maintained within 0.03 per cent by the latter process.

For brief reference use IAVE—915.

PRODUCTION AND USES OF OXYGEN

A new 24-page, two-color booklet, "Oxygen — Indispensable Servant of Industry," telling the interesting story about oxygen, how it is made and how it is used in industry, has been published by Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.

Other explanatory sections describe the different types of "packages" for varying oxygen volume requirements, operating conditions, and internal plant gas distribution methods. Also treated is Airco's Applied Engineering Service for helpful technical and on-the-job assistance. Descriptions of hand and mechanical welding, flame hardening, flame cleaning, underwater cutting, hand and machine gas cutting, and other flame processes developed or perfected in Airco's Research Laboratories are included along with photos of apparatus, accessories, and supplies, and other technical literature.

Copies of the booklet, No. ADG-2014, are available on request.

For brief reference use IAVE—916.

NEW BOOKLET ON HOW TO USE RADIAL POWER SAWS

Sawyers who want to operate DeWalt woodworking machines efficiently will find much useful information in the new technical manual, *How to Operate and Maintain the DeWalt Saw*, recently issued by the DeWalt Products Corp., Fountain Ave., Lancaster, Pa.

The manual is divided into two main sections. The first part clearly illustrates and explains in simple, direct manner the three radial movements of the saw and how they are quickly mastered by the novice who has just started to handle the machine.

Twenty-four different popular operations utilizing saw blades, dado heads, shaping cutters, router bits, and other tools are presented. Among operations shown are cutoff, miter, rip, bevel cutoff, bevel miter cut, angle rip, dado, gain plough, radius cut, flute, groove, tenon shape, rout, combined cutoff and dado, heel cut on rafters, jointing and sizing, stake cutting, and others.

The second section introduces and explains the simple mechanical adjustments that control and maintain the accuracy of every setting of the DeWalt variety saw.

The manual is available without charge to all inquirers. Present DeWalt owners, however, are asked to forward with their request the model designation as well as the serial numbers of machine and motor, to help check and bring service records to date.

For brief reference use IAVE—917.

IDLER BACKSTANDS

Belt grinding and finishing with idler backstands is fully described in an 8-page folder distributed by Behr-Manning Co., Troy, N. Y.

This method of using abrasive belts can be readily adapted to many uses. Installation costs are low, and production speeds are high.

The folder presents many interesting illustrations to show how idler backstands may be used for doing many kinds of grinding jobs.

For brief reference use IAVE—918.

EASY TO SEE WEEKLY WALL CALENDAR

This large calendar is printed in easy to read giant numerals for each week. Each weekly fly leaf also contains the current, previous, and following month.

New style lettering adds to the legibility and attractiveness, combining all of the practical value of the popular 1945 editions and the beauty of the multi-colored Stan Ekman illustration.

The calendar also presents a section of technical data covering wire and sheet metal gauges, screw threads, etc., plus a full 12-month calendar.

The 1946 calendars are furnished free of charge. Address all requests to the Frederick Post Co., Box 803, Chicago 90, Ill.

For brief reference use IAVE—919.

SOME EXCELLENT PUBLICATIONS

Teachers of aviation and automotive subjects will do well to investigate the following publications: "Handbook of Engine Maintenance," "Battery Charging," "Fast Battery Charging," "Magnetos," "Magnet and Rotor Recharging," "Engine Tune-Up," "Generators and Starting Motors," "Armature Testing," and "Ignition Distributors."

Full information about these instructive books may be obtained from Joseph Weidenhoff, Inc., Chicago 24, Ill.

For brief reference use IAVE—920.

HELPFUL PAMPHLETS ON HIGH SPEED CARBIDE MILLING

Two instructive pamphlets entitled "Recommendations for High Speed Carbide Milling," and "Recommendations for Grinding of Cutters for High Speed Carbide Milling," have just been published by The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

They are based on the firm's research and experience in actual shop practice, and present such data as proper cutting speeds, feeds, milling cutter angles, number of teeth per cutter, metal removal factor, machine selection and setup, and cutting fluids. The pamphlet on grinding presents important hints on how to keep up the cutting qualities of the carbide cutters to the highest efficiency.

For brief reference use IAVE—921.

INTERNATIONAL TEXTBOOK CATALOG

A new catalog has just been issued by the International Textbook Co., Scranton 9, Pa., covering the textbooks published by that firm in the following fields: accounting, architecture, art, automobile trades, aviation, blueprint read-

(Continued on next page)

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(Continued from previous page)

ing, building trades, chemistry, civil engineering, drafting, education, electrical engineering, elementary science, guidance, handbooks, industrial arts, marine engineering, mathematics, mechanical engineering, plumbing, shop and foundry practice, textiles, and miscellaneous subjects.

For brief reference use IAVE—922.

A BOOK ON CAM MILLING

An interesting and instructive booklet entitled "Methods of Cam Milling" has just been made available.

It was prepared and published as an educational service by the Kearney and Trecker Corp., Milwaukee 14, Wis.

The various methods are described in six chapters under the following headings: Using the Rotary Table, With the Dividing Head, Using Dummy Templates, On the Milwaukee Rotary Head Miller, Using the Cam Slide, and With Special Cam Slides.

For brief reference use IAVE—923.

A NEW CATALOG OF MACHINE TOOLS

A new 36-page catalog has just been issued by the Walker-Turner Co., Inc., Plainfield, N. J.

It covers band saws, belt and disk surfacers, radial cutoff machines, drill presses, grinders, motors, attachments, and transmission equipment.

EBERHARD FABER PENCIL COMPANY ELECTS NEW PRESIDENT

At a meeting of the directors of Eberhard Faber Pencil Co., Brooklyn, N. Y., on September 13, J. Coburn Musser was elected president.

Mr. Eberhard Faber, son of the founder, has retired as president, but continues active as the chairman of the board.

Mr. Musser has been vice-president of the corporation since 1939.

At the same meeting Carl P. Finck and Fred'k G. Huber were elected vice-presidents.

ALBERT J. ROSENBERG JOINS MC GRAW-HILL STAFF

Albert J. Rosenberg has joined the staff of the McGraw-Hill Book Company as visual aids editor. His main job will be to co-ordinate training films and other audio-visual material with McGraw-Hill textbooks. He will also assist with the technical editorial programs of the education departments.

PUBLICATIONS

(Continued from page 38A)

This bulletin presents an analysis, by state, of the age and schooling of army personnel, and also presents a background for interpreting such data as education of negro enlisted men, migration intentions of veterans, education chosen by veterans now in school, and the like.

Veteran's Guide

By Dallas Johnson. Public Affairs Pamphlet No. 102. Paper, 32 pages, 5⅞ by 8⅜. Price, 10 cents. Public Affairs Committee, Inc., 30 Rockefeller Plaza, New York 20, N. Y.

A handbook telling ex-servicemen and women how to get the most out of the rights and privileges which are justly theirs.

Training School Bus Drivers

Paper cover, 162 pages, 5⅞ by 9⅛ in., illustrated. Price, 30 cents. Vocational Division Bulletin No. 233. Federal Security Agency, U. S. Office of Education, U. S. Government Printing Office, Washington 25, D. C.

This bulletin contains a suggested instructional program prepared by The American Automobile Association and The Trade and Industrial Education Service of the Vocational Division of the U. S. Office of Education. It will be found excellent for any drivers' training course.

Frontier Thinking in Guidance

Edited by John R. Yale. Paper cover, spiral binding, 160 pages, 6 by 9 in. Published by Science Research Associates, Chicago 4, Ill.

A collection of articles on guidance which were written by authorities in the field of guidance, and which have appeared, fairly recently, in various educational periodicals.

Aeronautical Instrument Projects

By Walter B. Weber. Paper cover, 124 pages,

(Continued on next page)

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THE MANUAL ARTS PRESS

134 Duroc Bldg. Peoria 3, Illinois

PUBLICATIONS

(Continued from previous page)

6¼ by 10⅜ in., illustrated. Price, $1.20. Published by McKnight and McKnight, Bloomington, Ill.

This book presents not only simplified and practical explanations covering the many instruments used in aviation, but also shows the learner how to build and use them. There are 25 projects described.

How to Handle Collective Bargaining Negotiations

Multo binder, multigraphed, 38 pages, 8½ by 11 in. Price, $5. National Foremen's Institute, Inc., Deep River, Conn.

A manual for management prepared by bargaining experts collaborating with members of the editorial staff of "Executive's Labor Letter."

It lists the qualifications needed by the negotiator who has to carry on the negotiations, shows him how to prepare for the meetings, how to conduct them, gives him some sample contract provisions that have been tried out, discusses the unionization of foremen, the closed shop, and other factors that must be taken into account by management when collective bargaining negotiations are carried on.

Metalworking Shop

Prepared by William H. Myer, William L. Beck, Howard E. Way, and O. Schreiner, Jr., under the direction of H. B. McCoy. Paper cover, 202 pages, 5⅞ by 9⅜ in., illustrated. Price, 35 cents. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

A book for those who aim to enter a business of their own. This is the first of a series of similar books, and outlines the type of shops and work that might be undertaken, how to select the location for the business, capital needs, and methods of organizing and conducting the business.

Wartime Work for Girls and Women

Vocational Division Bulletin No. 227. Occupational Information and Guidance Series No. 11. Federal Security Agency, U. S. Office of Education, Washington, D. C.

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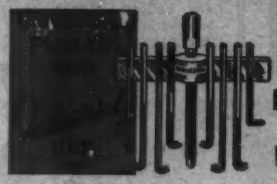

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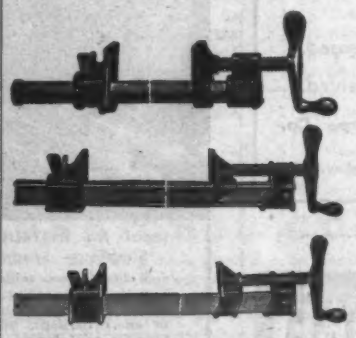

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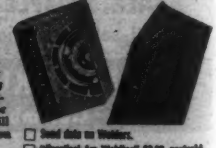

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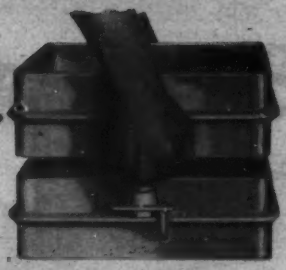

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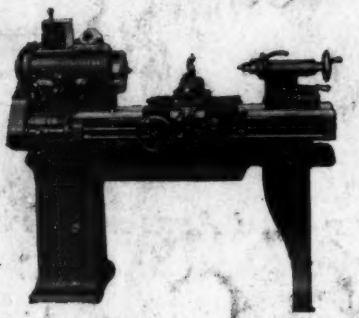

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